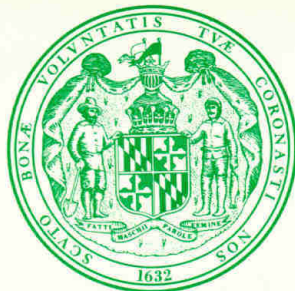


THE WICOMICO SCENIC RIVER STUDY AND MANAGEMENT PLAN



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STATE OF MARYLAND

The Honorable William Donald Schaefer, *Governor*

ACKNOWLEDGEMENTS

Concern, dedication and experience were the most important characteristics that the members of the Wicomico Scenic River Local Advisory Board brought to this project. These individuals spent many hours reviewing the study information, discussing issues and making final recommendations. Gratitude and thanks are also extended to those who previously served on the board. In addition to the board members, there were many citizens and local government officials who contributed directly or indirectly to this document. The collective efforts of these people will help to ensure that future generations may enjoy and benefit from the resources of the Wicomico River and Zekiah Swamp.

Professionals from many state and local agencies also generously donated their time and expertise to help complete this project. Their diverse knowledge was vital to addressing the wide ranging issues facing the Wicomico River watershed. Special thanks are extended to: Sherman Garrison and Deidre Murphy who are with the Department of the Environment; William Brumbley, Peggy Calnan, Terry Clark, Katharine McCarthy, Arnold Norden, Marcia Smith, Stan Tomaszewski and Jim Uphoff of the Department of Natural Resources; John Hutson of the Maryland Environmental Trust; Kevin Kirby and Peter Kumble of the Charles County Department of Planning and Growth Management; Jon R. Grimm and Jeff Jackman with the St. Mary's County Department of Planning and Zoning; Michael Kakuska of the Tri-County Council for Southern Maryland and Rebecca Hutchison of the Maryland Historical Trust. **This publication was generously funded in part by a grant from the Chesapeake Bay Trust.**

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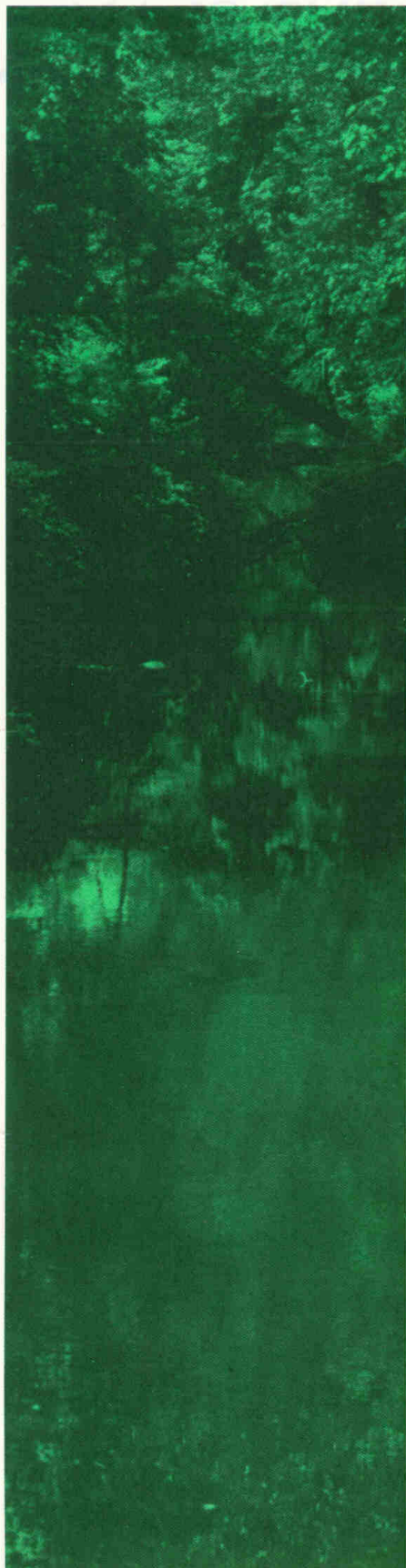
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BACKGROUND AND INTRODUCTION

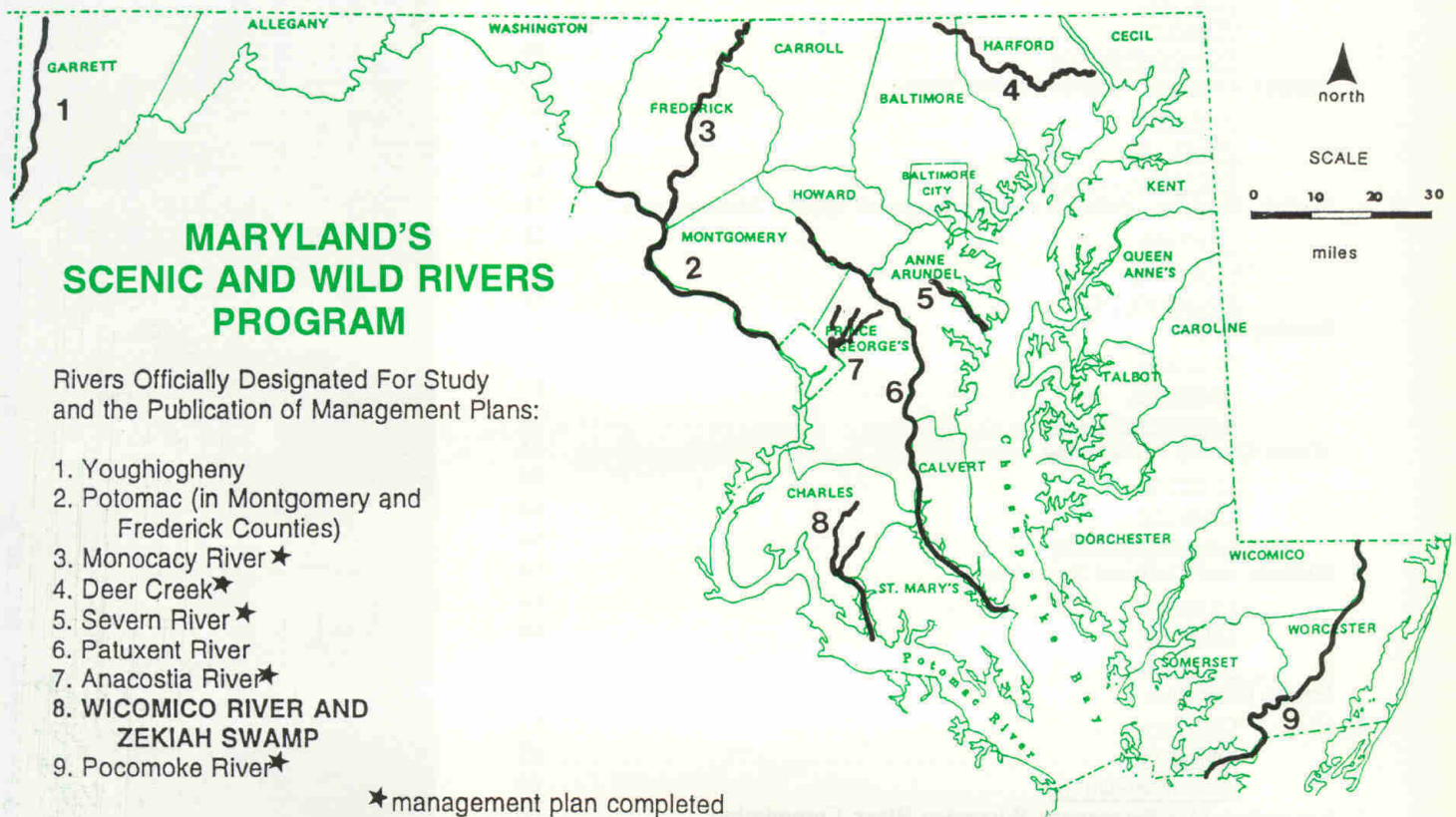
OVERVIEW

The increasing pressures of rural development, industrial activities, urban sprawl and their often adverse effects on our nation's natural resources became an important issue throughout the United States in the late 1960's. Water pollution control and conservation of other water resource values received particular attention. Congress enacted many different pieces of legislation to address water related issues including the 1968

National Wild and Scenic Rivers Act and the 1972 Federal Water Pollution Control Act, which subsequently became known as the Clean Water Act. The National Wild and Scenic Rivers Act provides a mechanism for the federal government to protect and ensure the wise management of certain rivers and their related resources.

To focus river conservation efforts on a state-wide basis, Maryland adopted its own Scenic and Wild Rivers Act (Annotated Code of

Maryland, Article-Natural Resources, Section 8-401 through 8-411) in 1968. The Wicomico River is one of nine rivers that have been designated as components of the Maryland Scenic and Wild Rivers system under this legislation. In order to receive such recognition, a river and its related adjacent land areas must possess outstanding scenic, geologic, ecologic, historic, recreational, agricultural, fish, wildlife, cultural or other similar resources.



Zekiah Swamp, which is the largest tributary of the Wicomico River, has also received attention for its unique resource values. In their 1974 study of natural areas in the Chesapeake Bay region, the Smithsonian Institution identified the Zekiah Swamp as one of the most important remaining ecological areas on the East Coast. The Zekiah was designated an area of Critical State Concern by the Maryland Department of State Planning in 1981. The United States Fish and Wildlife Service has

identified the Zekiah Swamp as a priority wetland under the 1986 Emergency Wetlands Resources Act. In 1990, the Zekiah was designated a Nontidal Wetland of Special State Concern under the Maryland Nontidal Wetlands Protection Act.

PURPOSE

The purpose of this Wicomico River Study and Management Plan is established in the Maryland Scenic and Wild Rivers Act as amended in 1987.

Section 8-401 declares that it is the policy of the State of Maryland to preserve and protect the natural values of designated Scenic or Wild Rivers, enhance their water quality, and fulfill vital conservation purposes by the wise use of resources within their surrounding environment. Section 8-402 (b) states that a plan shall be prepared to provide for the wise use of resources according to the policy under Section 8-401. (See Appendix F, Scenic and Wild Rivers Act.)

GOALS

In response to the legislative mandates of the Scenic and Wild Rivers Act, the Wicomico River Local Advisory Board, composed of Charles and St. Mary's County residents, was formed in 1988. It is through the Board's efforts, combined with the input of other local residents who attended the public board meetings, that feasible goals, policies and strategies for the management of the Wicomico River and Zekiah Swamp have been formulated. The specific goals of this management plan are to:

- 1) *Protect and maintain the outstanding natural and cultural resources of the Wicomico River and Zekiah Swamp and their tributaries;*
- 2) *Maintain and enhance water quality;*
- 3) *Maintain and conserve existing agricultural lands in their current condition;*
- 4) *Encourage the continued economic and appropriate recreational use of the Wicomico River, Zekiah Swamp and their adjacent lands, consistent with the other goals of this plan;*
- 5) *Protect private property rights while allowing for the continued public use and*
- 6) *Develop multi-jurisdictional cooperation and coordination with respect to the management and protection of the Wicomico River and Zekiah Swamp;*
- 7) *Provide a reference of resource information about the Wicomico River watershed for local, state and federal government agencies, elected officials and the citizens of Charles and St. Mary's Counties;*
- 8) *Increase public awareness about the Wicomico River, Zekiah Swamp and their related resources.*

The intentions of the Wicomico River Study and Management Plan are to preserve and protect the resources of the river, swamp and adjacent lands through a program initiated and controlled by local citizens and their local government. The Plan is not intended as a regulatory document, but as a guide for local and state governments. It is also important to remember that this plan is not a conclusive solution to

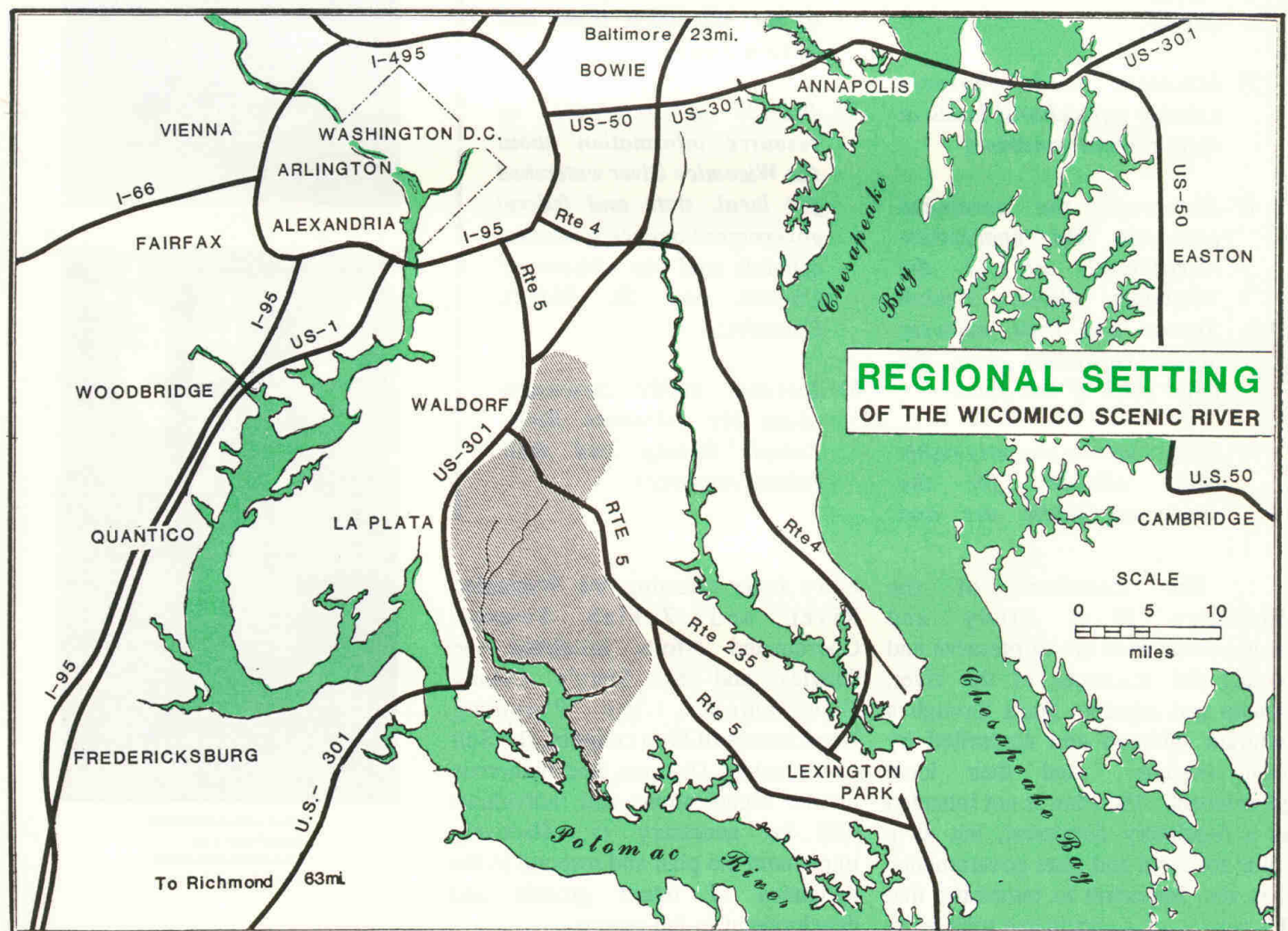
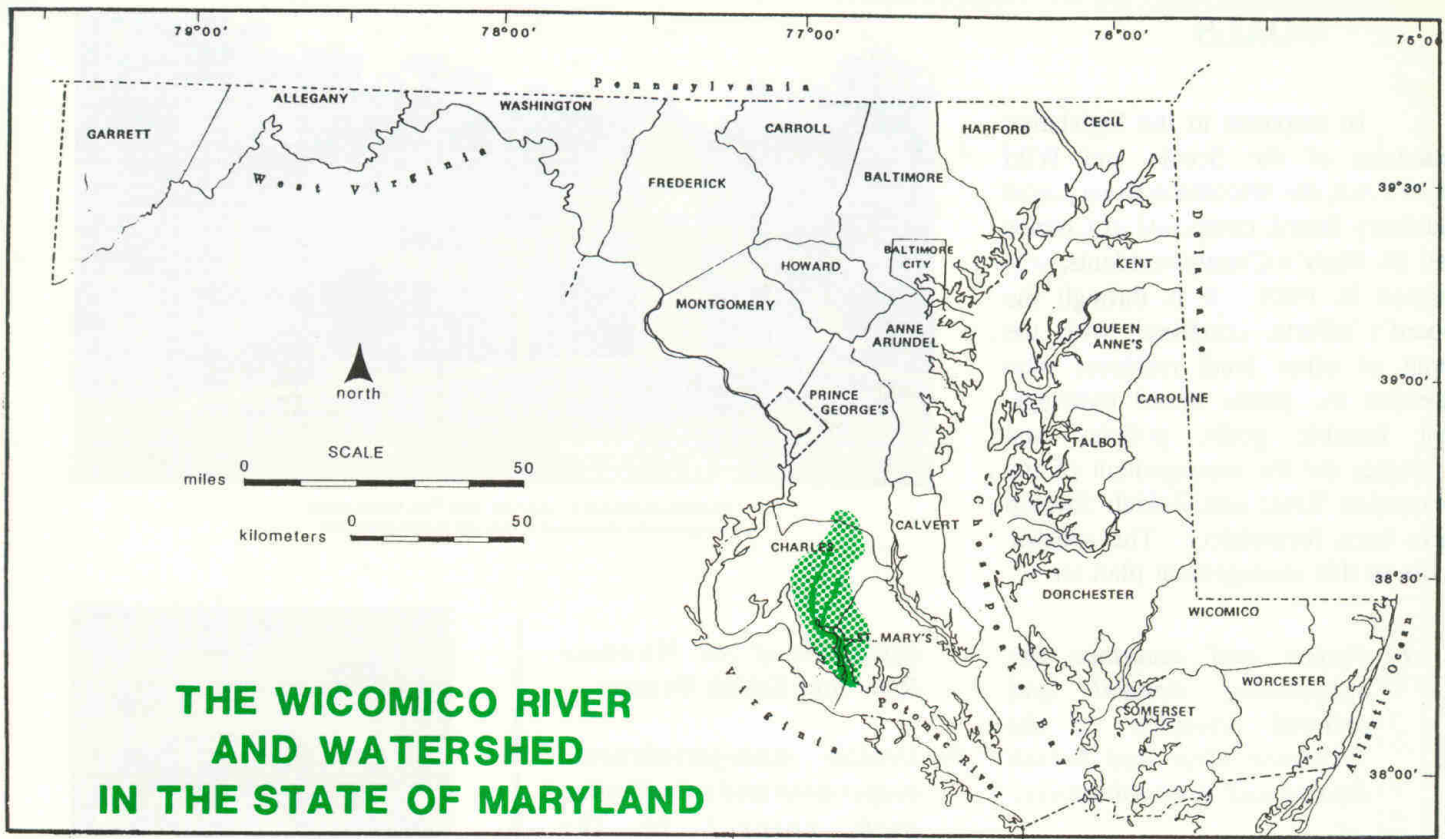
every issue effecting the Wicomico River and Zekiah Swamp. Coordinated efforts involving the Charles and St. Mary's County Governments, the Planning Departments of both counties, the Soil Conservation Districts, and numerous private organizations and individuals will be necessary to effectively implement the plan and respond to the dynamics of future growth and development in the region.

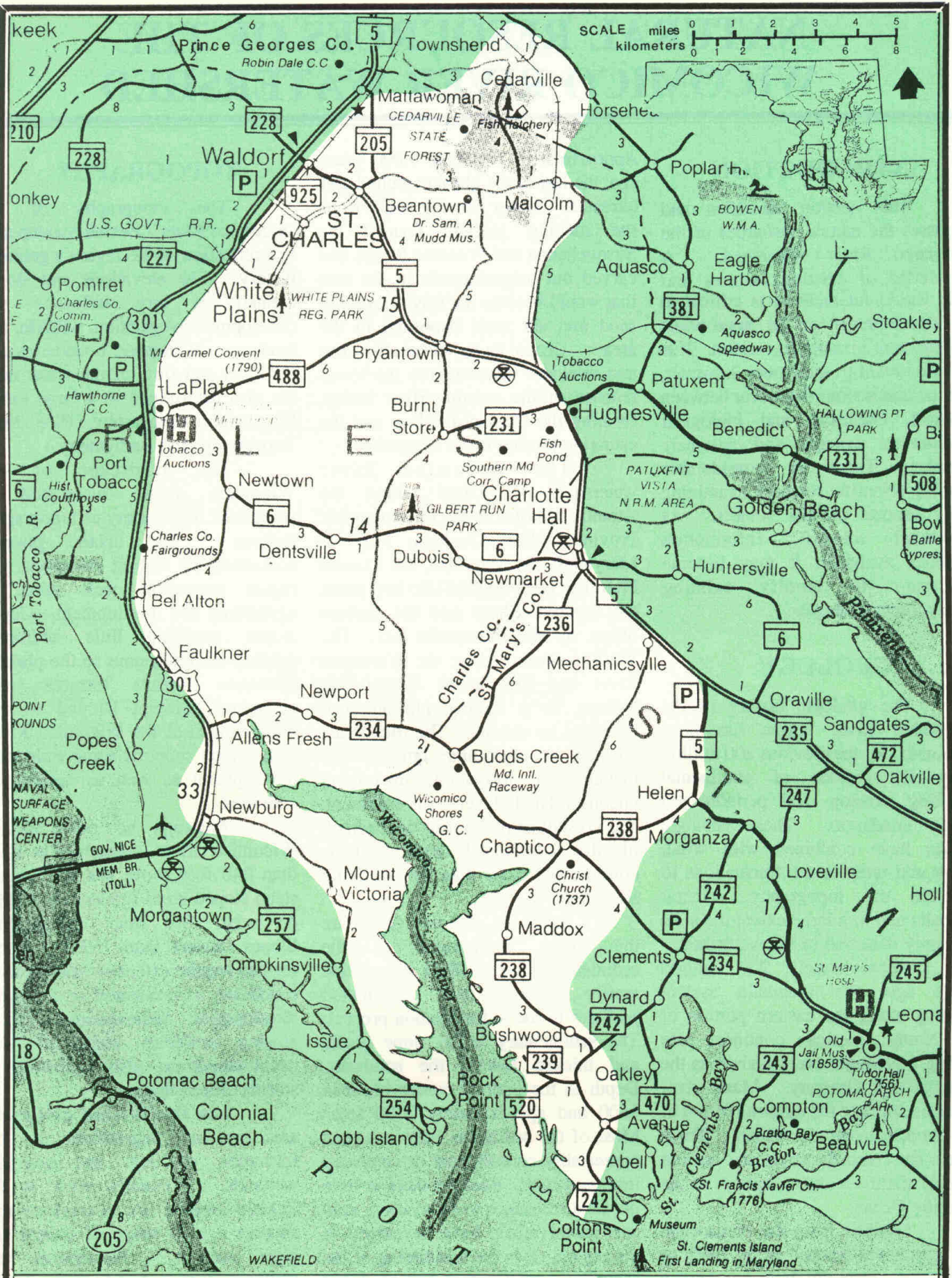


Educational displays in Cedarville State Park headquarters increase public awareness of river and swamp resources.



Picnic area in Cedarville State Forest is an appropriate recreational use of Zekiah Swamp.





MAJOR ROAD NETWORK IN THE WICOMICO SCENIC RIVER WATERSHED

NATURAL RESOURCES OF THE WICOMICO RIVER WATERSHED

INTRODUCTION

This section identifies and discusses the natural resources of the Wicomico River watershed. A knowledge of existing features and their varied interactions is critical to the development of an appropriate management plan for the region. It is also important to remember, however, that the interactions that occur between physical, chemical, and biological systems are dynamic and extremely complex. There is considerable ongoing scientific research examining many aspects of this subject. As additional scientific information becomes available, it may become necessary to modify existing management strategies.

GEOLOGY

The geologic history of the Wicomico River region has been dominated for the previous 200 million years by periods of continental uplifting, erosion and periodic sea water inundation. These geologic events have combined with wind, water and temperature fluctuations to produce the topography, mineral deposits and to a large extent the soils currently observed in the watershed.

Approximately 200 million years ago, the mountain system running along the eastern portion of the North American continent rose during a geologic event known as the Appalachian Orogeny. Many river systems draining the eastern portion of the Appalachians developed. These rivers cut channels across the ancient coastal plain on their journey to the Atlantic Ocean.

Glaciers from the Pleistocene ice ages never reached as far south as Maryland. They did, however, have a significant impact on the geology of the Chesapeake Bay region.

Approximately 15,000 to 9,000 years ago, the last of the glaciers melted and retreated.¹ Water flowing south from the melting glaciers formed the Susquehanna and Potomac Rivers and carved out paleochannels in the area that would become the Bay. Layers of sand and silt were deposited in the area. Ocean levels eventually rose and seawater intruded into the lower reaches of the existing river basins, forming the Chesapeake Bay and the estuarine portion of its tributaries.

The Wicomico River watershed is located within the Atlantic Coastal Plain Physiographic Province. (See: Geologic Map of Maryland) In Maryland, the Coastal Plain has been divided into two parts, the Western Shore and the Eastern Shore, by the Chesapeake Bay. The Western Shore, where the Wicomico River and the Zekiah Swamp are located, is a rolling plateau well dissected by streams. The rock strata consists of crystalline igneous and metamorphic formations underlying unconsolidated layers of sediment. The crystalline rock forms the bedrock of the continental crust and is considerably older than the overlying sediment.

Sand, silt, clay and gravel are the major components of the sedimentary layers. Both upland and marine sources have contributed particles to the sedimentation process. The sedimentary layers slope gently and thicken toward the southeast. Depth to the bedrock varies between 1500 and approximately 2000 feet.² Most of the sediments have not been appreciably consolidated or cemented into hard rock. Because there is little physical resistance to excavation, sand and gravel mines have developed in the region. It is the weathering of the sediment particles that has produced the parent material for the watershed's soils.

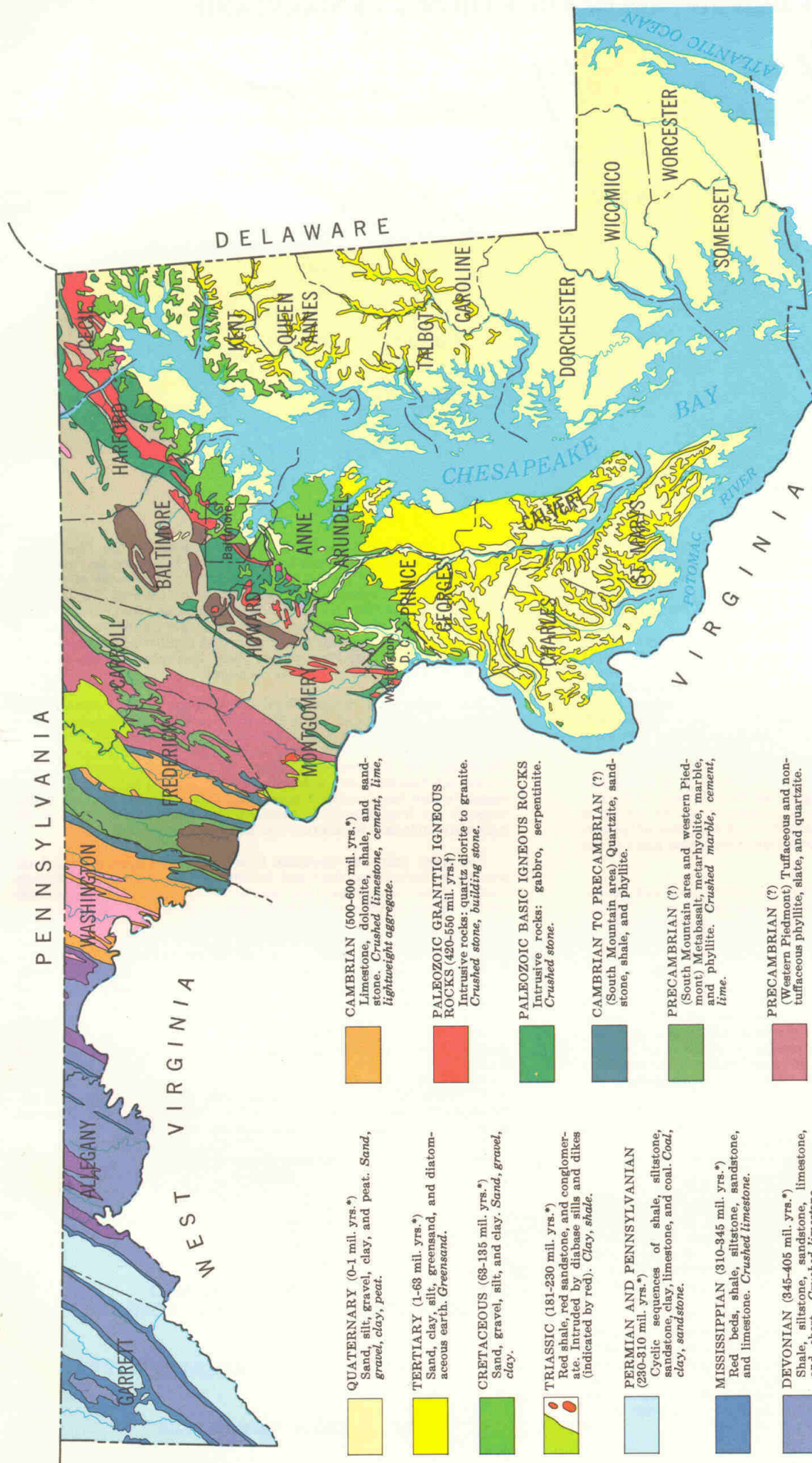
TOPOGRAPHY

The topography of the Wicomico River - Zekiah Swamp area is a reflection of the region's geologic history. The elevations and slopes created in turn influence soil development, vegetation, wildlife, and land use. Watershed boundaries and the level and flow of the water table are also determined to a large extent by surface topography. (See Map: Topography and Bathymetry.)

The landscape of the Wicomico River watershed is comprised of a variety of topographic regions. The upland plateau, containing the highest elevations, is a region reasonably well suited to agriculture and development. Gentle slopes requiring little additional grading are indigenous to the plateau. Shoreline stream terraces with elevations between 10 and 40 feet border much of the Wicomico River. This region supports some residential development as well as agricultural activities.

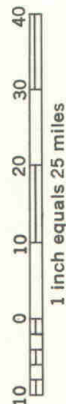
Although no point in the Wicomico River watershed is more than 240 feet above sea level, some steep sloped areas (greater than 15%) do exist. (See Map: Topography-Slopes Greater than 15%.) These regions require extensive grading to be conducive to residential or industrial development. Sedimentation and soil erosion problems associated with development are also intensified in steeply sloped areas.

Low elevation and level terrain are essential ingredients in the formation of tidal and non-tidal wetlands. Wetlands, such as the Zekiah Swamp, are ecosystems that support a wide range of animal and plant species. Floodplains and wetlands contain poorly drained soil. This condition makes development and agriculture difficult and expensive.



MARYLAND GEOLOGICAL SURVEY
Kenneth N. Weaver, Director

GENERALIZED GEOLOGIC MAP OF MARYLAND* 1967



* A detailed Geologic Map of Maryland, 1968 at a scale of 1 inch equals 4 miles, is also available.

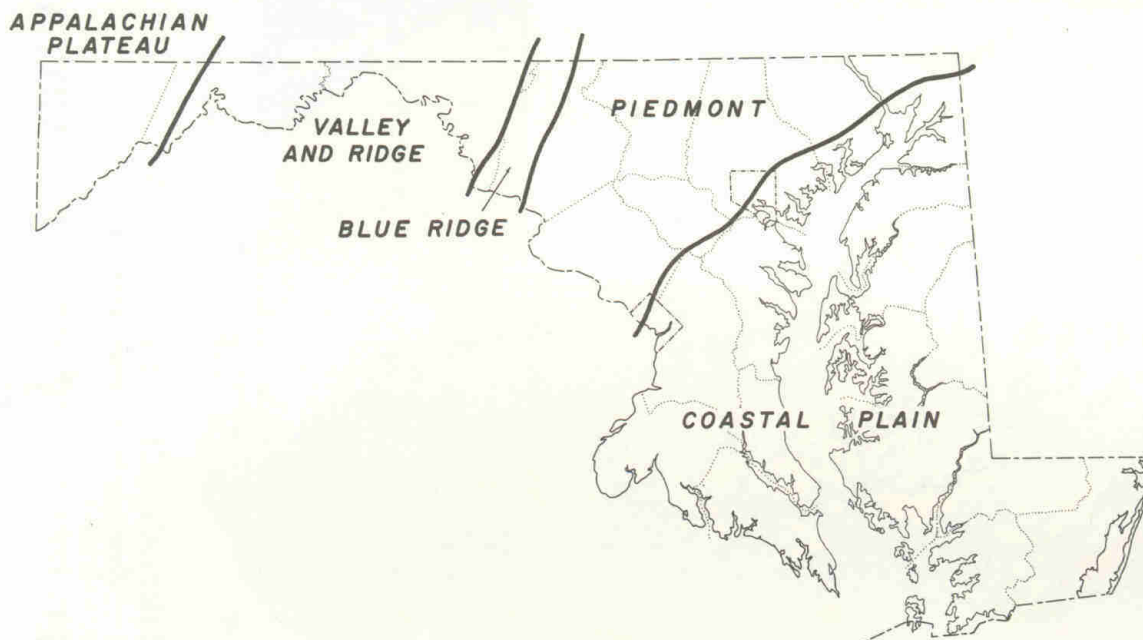
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| | QUATERNARY (0-1 mil. yrs.)*
Sand, silt, gravel, clay, and peat. <i>Sand, gravel, clay, peat.</i> | | CAMBRIAN (500-600 mil. yrs.)*
Limestone, dolomite, shale, and sandstone. <i>Crushed limestone, cement, lime, lightweight aggregate.</i> |
| | TERTIARY (1-63 mil. yrs.)*
Sand, clay, silt, greensand, and diatomaceous earth. <i>Greensand.</i> | | PALEOZOIC GRANITIC IGNEOUS ROCKS (420-550 mil. yrs.†)
Intrusive rocks: quartz diorite to granite. <i>Crushed stone, building stone.</i> |
| | CRETACEOUS (63-135 mil. yrs.)*
Sand, gravel, silt, and clay. <i>Sand, gravel, clay.</i> | | PALEOZOIC BASIC IGNEOUS ROCKS
Intrusive rocks: gabbro, serpentinite. <i>Crushed stone.</i> |
| | TRIASSIC (181-230 mil. yrs.)*
Red shale, red sandstone, and conglomerate. Intruded by diabase sills and dikes (indicated by red). <i>Clay, shale.</i> | | CAMBRIAN TO PRECAMBRIAN (?) (South Mountain area) Quartzite, sandstone, shale, and phyllite. |
| | PERMIAN AND PENNSYLVANIAN (230-310 mil. yrs.)*
Cyclic sequences of shale, siltstone, sandstone, clay, limestone, and coal. <i>Coal, clay, sandstone.</i> | | PRECAMBRIAN (?) (South Mountain area and western Piedmont) Metabasalt, metarhyolite, marble, and phyllite. <i>Crushed marble, cement, lime.</i> |
| | MISSISSIPPIAN (310-345 mil. yrs.)*
Red beds, shale, siltstone, sandstone, and limestone. <i>Crushed limestone.</i> | | PRECAMBRIAN (?) (Western Piedmont) Tuffaceous and non-tuffaceous phyllite, slate, and quartzite. |
| | DEVONIAN (345-405 mil. yrs.)*
Shale, siltstone, sandstone, limestone, and chert. <i>Crushed limestone.</i> | | PRECAMBRIAN (?) (Eastern Piedmont) Schist, metagraywacke, quartzite, marble, and metavolcanic rocks. <i>Crushed stone, crushed marble, building stone.</i> |
| | SILURIAN (405-425 mil. yrs.)*
Shale, mudstone, sandstone, and limestone. <i>Glass sand, crushed limestone.</i> | | PRECAMBRIAN BASEMENT COMPLEX (1100 mil. yrs.†)
Gneiss, migmatite, and augen gneiss. |
| | ORDOVICIAN (425-500 mil. yrs.)*
Limestone, dolomite, shale, siltstone, and red beds. Slate and conglomerate in northern Harford County. <i>Crushed limestone, cement, clay, lime.</i> | | |

Most important mineral products in italics.

* Age ranges from Kulp, J. L., 1961, *Geologic time scale*, Science, v. 133, no. 3459, p. 1105-1114.

† Radiometric dates made on Maryland rocks.

A BRIEF DESCRIPTION OF THE GEOLOGY OF MARYLAND



Maryland is part of three distinct physiographic regions: (1) the Coastal Plain Province, (2) the Piedmont Province, and (3) the Blue Ridge, Valley and Ridge, and Appalachian Plateau Provinces. These extend in belts of varying width along the eastern edge of the North American continent from Newfoundland to the Gulf of Mexico.

The Coastal Plain Province is underlain by a wedge of unconsolidated sediments including gravel, sand, silt, and clay, which overlaps the rocks of the eastern Piedmont along an irregular line of contact known as the Fall Zone. Eastward, this wedge of sediments thickens to more than 8,000 feet at the Atlantic coast line. Beyond this line is the Continental Shelf, the submerged continuation of the Coastal Plain, which extends eastward for at least another 75 miles where the sediments attain a maximum thickness of about 40,000 feet.

The sediments of the Coastal Plain dip eastward at a low angle, generally less than one degree, and range in age from Triassic to Quaternary. The younger formations crop out successively to the southeast across Southern Maryland and the Eastern Shore. A thin layer of Quaternary gravel and sand covers the older formations throughout much of the area.

Mineral resources of the Coastal Plain are chiefly sand and gravel, and are used as aggregate materials by the construction industry. Clay for brick and other ceramic uses is also important. Small deposits of iron ore are of historical interest. Plentiful supplies of ground water are available from a number of aquifers throughout much of the region.

The Piedmont Province is composed of hard, crystalline igneous and metamorphic rocks and extends from the inner edge of the Coastal Plain westward to Catoctin Mountain, the eastern boundary of the Blue Ridge Province. Bedrock in the eastern part of the Piedmont consists of schist, gneiss, gabbro, and other highly metamorphosed sedimentary and igneous rocks of probable volcanic origin. In several places these rocks have been intruded by granitic plutons and pegmatites. Deep drilling has revealed that similar metamorphic and igneous rocks underlie the sedimentary rocks of the Coastal Plain. Several domal uplifts of Precambrian gneiss mantled with quartzite, marble, and schist are present in Baltimore County and in parts of adjacent counties. Differential erosion of these contrasting rock types has produced a distinctive topography in this part of the Piedmont.

The rocks of the western part of the Piedmont are diverse and include phyllite, slate, marble, and moderately to slightly metamorphosed volcanic rocks. In central Frederick County the relatively flat Frederick Valley is developed on Cambrian and Ordovician limestone and dolomite. Gently undulating plains underlain by unmetamorphosed bedrock of Triassic red shale, siltstone, and sandstone occur in three areas in the western Piedmont.

The Piedmont Province contains a variety of mineral resources. Formerly, building stone, slate, and small deposits of non-metallic minerals, base-metal sulfides, gold, chromite, and iron ore were mined. Currently, crushed stone is important for aggregate, cement, and lime. Small to moderate supplies of ground water are available throughout the region, but favorable geological conditions locally may provide larger amounts.

Unlike the Coastal Plain and Piedmont Provinces, the Blue Ridge, Valley and Ridge, and Appalachian Plateau Provinces are underlain mainly by folded and faulted sedimentary rocks. The rocks of the Blue Ridge Province in western Frederick County are exposed in a large anticlinal fold whose limbs are represented by Catoctin Mountain and South Mountain. These two ridges are formed by Lower Cambrian quartzite, a rock which is very resistant to the attack of weathering and erosion. A broad valley floored by Precambrian gneiss and volcanic rock lies in the core of the anticline between the two ridges.

The Valley and Ridge Province between South Mountain in Washington County and Dans Mountain in western Allegany County contains strongly folded and faulted sedimentary rocks. In the eastern part of the region, a wide, open valley called the Great Valley, or in Maryland, the Hagerstown Valley, is formed on Cambrian and Ordovician limestone and dolomite. West of Powell Mountain, a more rugged terrain has developed upon shale and sandstone bedrock which ranges in age from Silurian to Mississippian. Some of the valleys in this region are underlain by Silurian and Devonian limestones.

For many years the limestone formations have been used as local sources of agricultural lime and building stone. Modern uses include crushed stone for aggregate and cement. A pure, white sandstone in the western region of the province is suitable for glass manufacturing.

The Appalachian Plateau Province includes that part of Allegany County west of Dans Mountain and all of Garrett County, the westernmost county in Maryland. The bedrock of this region consists principally of gently folded shale, siltstone, and sandstone. Folding has produced elongated arches across the region which expose Devonian rocks at the surface. Most of the natural gas fields in Maryland are associated with these anticlinal folds in the Appalachian Plateau. In the intervening synclinal basins, coal-bearing strata of Pennsylvanian and Permian ages are preserved.

The sedimentary rocks of the Blue Ridge, Valley and Ridge, and Appalachian Plateau Provinces yield small to moderate supplies of ground water. Under favorable conditions large amounts may occur.

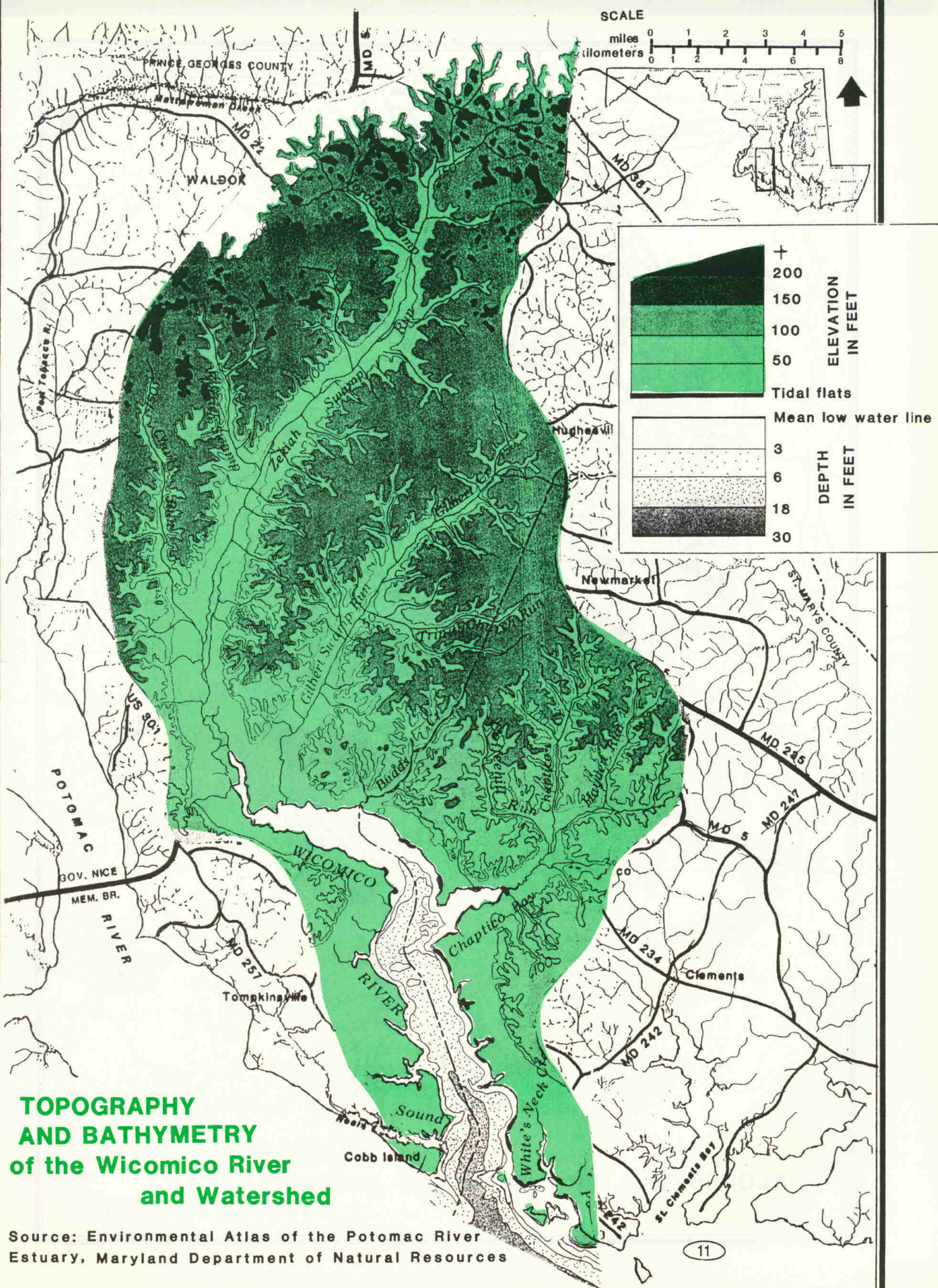
Jonathan Edwards, Jr.
Geologist

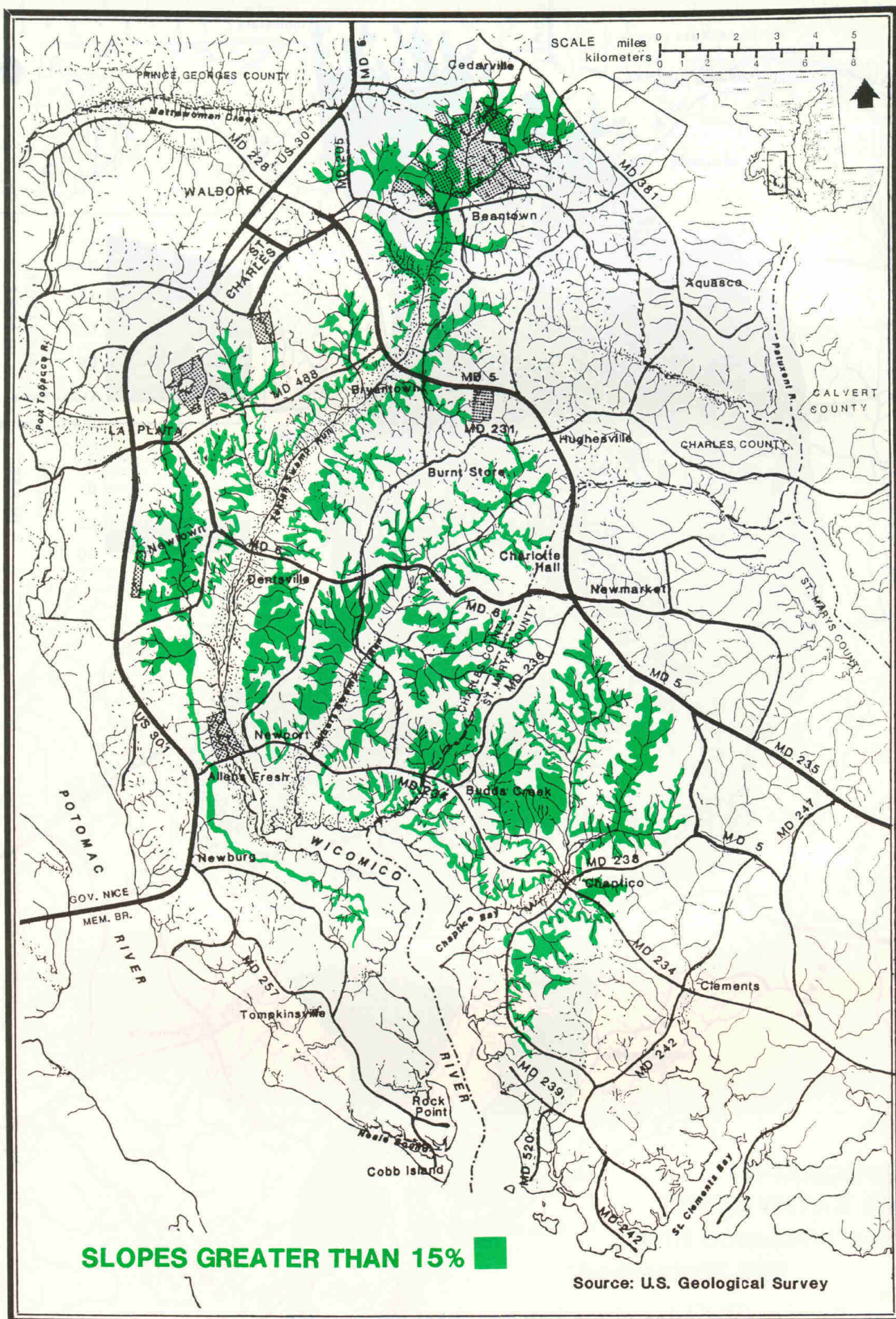
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STATE OF MARYLAND
DEPARTMENT OF NATURAL RESOURCES

Prepared by the
MARYLAND GEOLOGICAL SURVEY

Baltimore, Maryland 21218





CLIMATE

Charles and St. Mary's Counties are positioned in the middle latitudes. They possess a continental type climate with moderate humidity and well defined seasons. The general flow of the atmosphere in this region is from west to east although prevailing winds from the south are not uncommon during the summer months.

The mean daily temperature in the Wicomico River region is 55.8

degrees F. Mean monthly temperatures vary from 34.6 degrees F in January, to 75.9 degrees F in July. Precipitation is fairly uniform throughout the year. Mean annual precipitation is 42.62 inches.³ Most precipitation is in the form of rain, although frozen forms can occur in the winter. Average yearly snowfall is approximately 16 inches. Damaging storms such as blizzards, tornados and hurricanes have occurred.

SOILS

Soils are derived from parent rock material, living organisms, climate, topography and the interactions between them over time. All of these elements have some influence on soil formation in the Wicomico River watershed. The impact of each factor does, however, vary from region to region.

Parent material provides the mineral skeleton of the soil and influences the texture and mineralogy of the resulting soil profile. The parent material of all soil in the Wicomico River watershed is the unconsolidated sediment of the Coastal Plain. Soils formed from sandy or gravelly sediment retain much of their coarse characteristics. Fine textured soils tend to develop from clay sediments.

Wind, precipitation and temperature strongly influence the weathering of rocks and minerals. Soils are more weathered in hot, humid conditions than in cold or dry climates. Precipitation also influences soil formation through erosion, leaching and chemical reaction. The climate in the Wicomico River watershed is fairly uniform. As a result, there are no significant differences among the region's soils caused by climate alone.

The main feature that distinguishes soil from its parent material is the organic component of living organisms and their decomposed waste products and remains. Microorganisms, insects, plants, and animals all influence soil formation. During the early stages of soil formation, organisms such as bacteria,

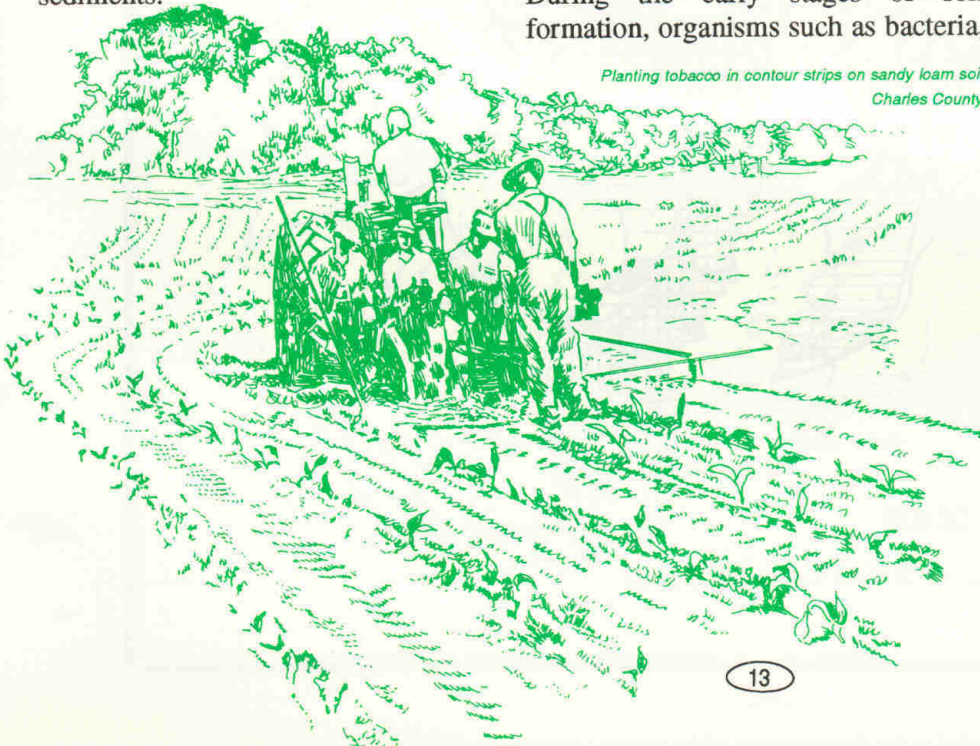
The period between the last frost in spring and the first in fall is known as the growing season. In the Wicomico River watershed, this period averages 166-187 days.⁴ The region's ample precipitation and moderate temperatures combine with this relatively long growing season to provide many agricultural opportunities.

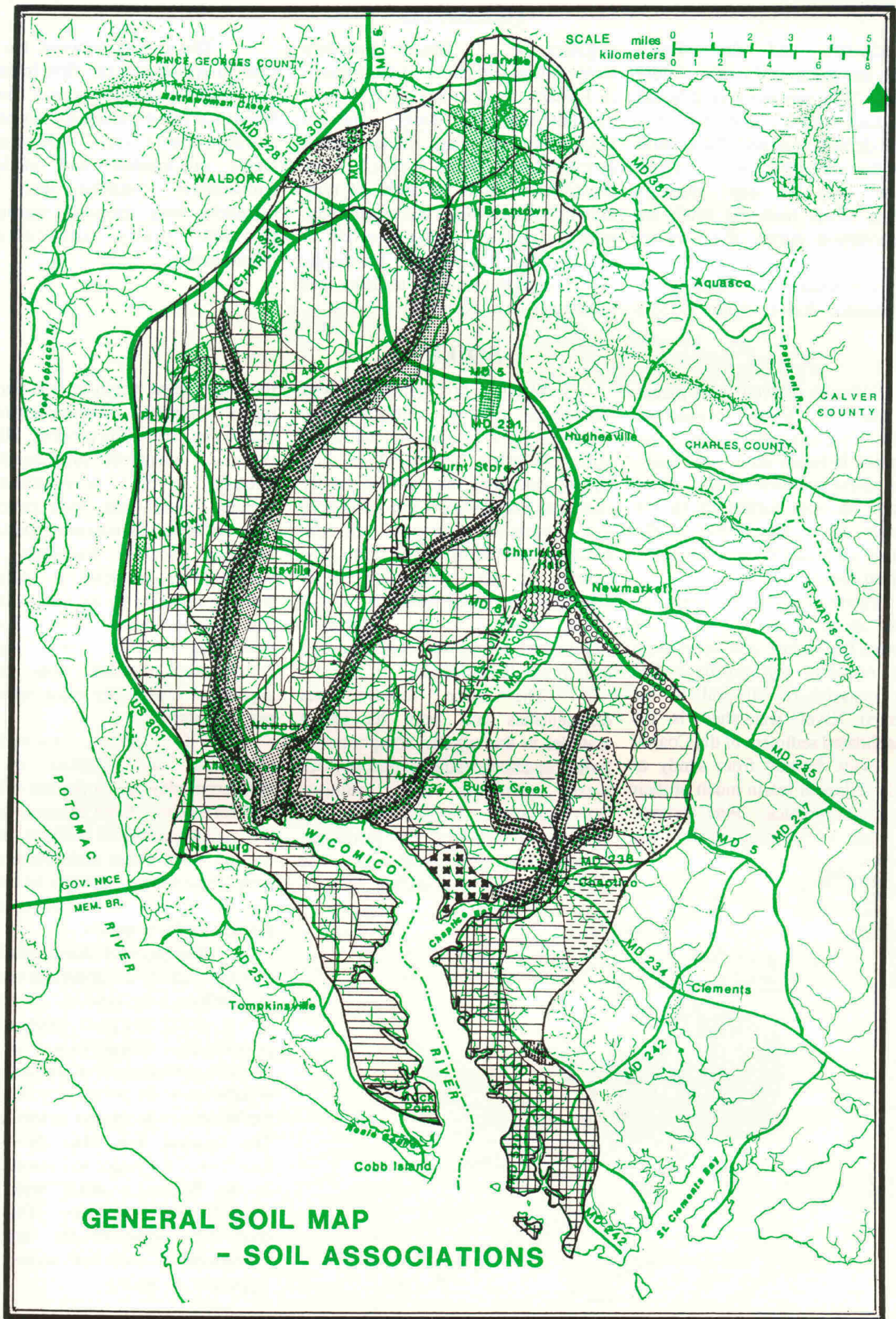
fungi and algae begin to colonize the parent material. These organisms hasten the weathering process. Higher organisms eventually supplement the microbes. Soil development is affected when plant roots penetrate existing material increasing porosity, breaking coarse fragments and withdrawing nutrients. Organic material is added to the soil as plants and animals die and decay. Further weathering occurs when organic compounds released from living organisms chemically react with the parent material.

The shape, elevation, orientation and gradient of the landscape play an important role in soil formation. Even in areas where the parent material is uniform, higher erosion rates cause soils formed on steep gradients to generally be thinner and not as well developed as those formed on level terrain.

The physical characteristics of soil associations are important because they influence the type and abundance of vegetation and place limits on the possible uses of land. In addition, soil particles that erode from the land are a significant water pollution problem in the Wicomico River and its tributaries. The General Soil Map shows the locations of the major soil associations in the Wicomico River watershed. (See: General Soil Map.) The soils chart lists some of the land use limitations of each soil series. (See Appendix A, Soils.)

*Planting tobacco in contour strips on sandy loam soil,
Charles County.*





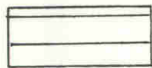
GENERAL SOIL MAP
- SOIL ASSOCIATIONS

SOIL ASSOCIATIONS

Wicomico River Watershed



Beltsville-Evesboro-Sassafras association: Level to moderately sloping, moderately well drained to excessively drained, loamy and sandy soils, some of which are only moderately deep to a hard, dense, root-inhibiting fragipan



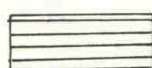
Beltsville-Croom-Sassafras association: Level to strongly sloping, moderately well drained and well drained, silty and loamy soils, some of which have a fragipan or compact gravelly subsoil; on uplands



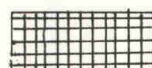
Beltsville-Gravelly land-Bourne association: Level to moderately sloping, moderately well drained, loamy soils that are only moderately deep to a dense, root-inhibiting fragipan, and steep, gravelly soil material



Beltsville-Exum-Wickham association: Level to moderately sloping, moderately well drained and well drained loamy soils, some of which are only moderately deep to a hard, dense, root-inhibiting fragipan



Elkton-Othello-Keyport association: Nearly level to moderately sloping, poorly drained and moderately well drained, loamy soils, some of which have a clayey subsoil



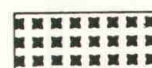
Othello-Mattapex association: Level to gently sloping, poorly drained and moderately well drained, silty soils that have a silty subsoil; on uplands and terraces



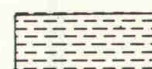
Bibb-Tidal Marsh-Swamp association: Level or nearly level, poorly drained soils on flood plains and miscellaneous unclassified wetland



Sassafras-Mattapex-Othello association: Level to gently sloping, well drained, moderately well drained, and poorly drained loamy soils



Matapeake-Mattapex-Sassafras association: Nearly level to strongly sloping, well drained and moderately well drained, silty and loamy soils generally underlain by a sandy substratum; on uplands and terraces



Beltsville-Caroline association: Level to moderately sloping, moderately well drained and well drained, silty soils, some of which are moderately deep to a fragipan; on uplands



Chillum-Beltsville-Sassafras association: Nearly level to strongly sloping, well drained and moderately well drained, silty and loamy soils underlain by gravelly material that is dense and compact in places; on uplands and terraces



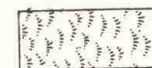
Beltsville-Croom-Evesboro association: nearly level to moderately sloping, moderately well drained to excessively drained, silty gravelly, and very sandy soils; on uplands



Evesboro association: Nearly level to steep, excessively drained, very sandy soils; on uplands



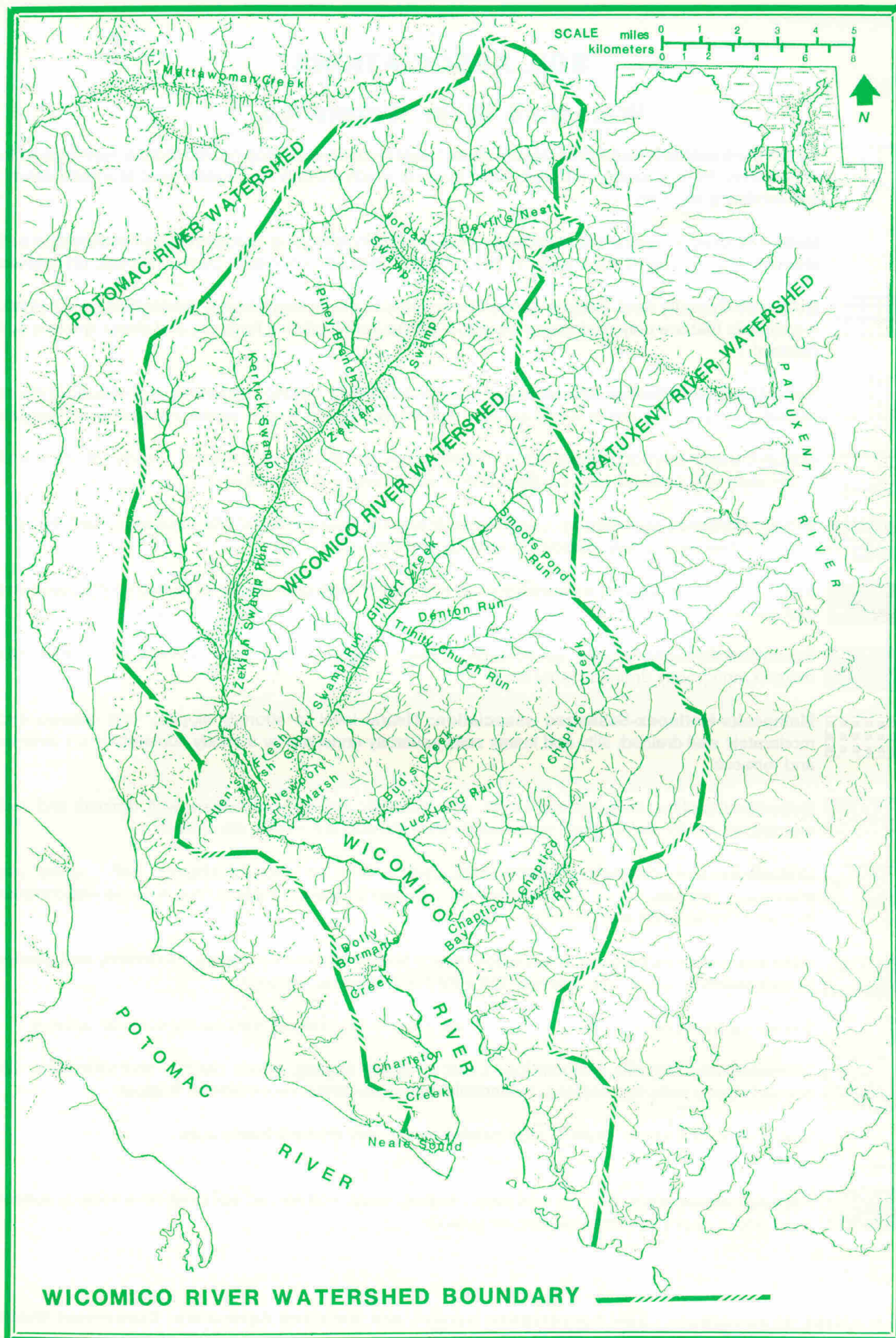
Leonardtown-Beltsville association: Level to gently sloping, poorly drained and moderately well drained, loamy soils that are only moderately deep to a dense, root-inhibiting fragipan



Magnolia association: Level to moderately sloping, well drained, loamy soils



Faceville association: Level to moderately sloping, deep, well drained soils that have a loamy surface layer and a clayey or loamy subsoil; on uplands



HYDROLOGY

SURFACE WATER

Hydrology examines the circulation and distribution of water. The hydrology of a drainage basin plays an important role in the transport of pollutants. Hydrologic factors also greatly influence plant, wildlife, fish and shellfish habitats. Water in the Wicomico River and its tributaries is derived from precipitation, surface runoff, tidal mixing and groundwater discharge. Water loss from the river system occurs primarily from discharge to the Potomac River, evaporation, transpiration and groundwater recharge.

The Zekiah Swamp runs for twenty miles through Prince George's and Charles Counties from its headwaters in Cedarville State Forest until joining the Wicomico River at Allens Fresh. The Zekiah Swamp drains an area of approximately 104 square miles in Charles County and is the largest contributor of fresh water to the Wicomico River. Major tributaries of the Zekiah Swamp include: Clark Run, Jordan Swamp, Kerricks Swamp and Wolf Den Branch.

The Wicomico River extends for sixteen miles from Allens Fresh to its confluence with the Potomac River, forming the drainage basin for approximately 247 square miles of Charles and St. Mary's Counties. Major tributaries of the Wicomico River include: Budds Creek, Chaptico Bay, Chaptico Run, Charleston Creek, Dolly Borman Creek, Gilbert Run, Hatton Creek and Zekiah Swamp. (See Maps: Wicomico River Watershed Boundary and One Hundred Year Flood Zone.)



*Confluence of
the Wicomico
and
Potomac
Rivers.*



*Allen's
Fresh
Marsh.*



*Zekiah
Swamp Run in
Cedarville
State
Forest.*

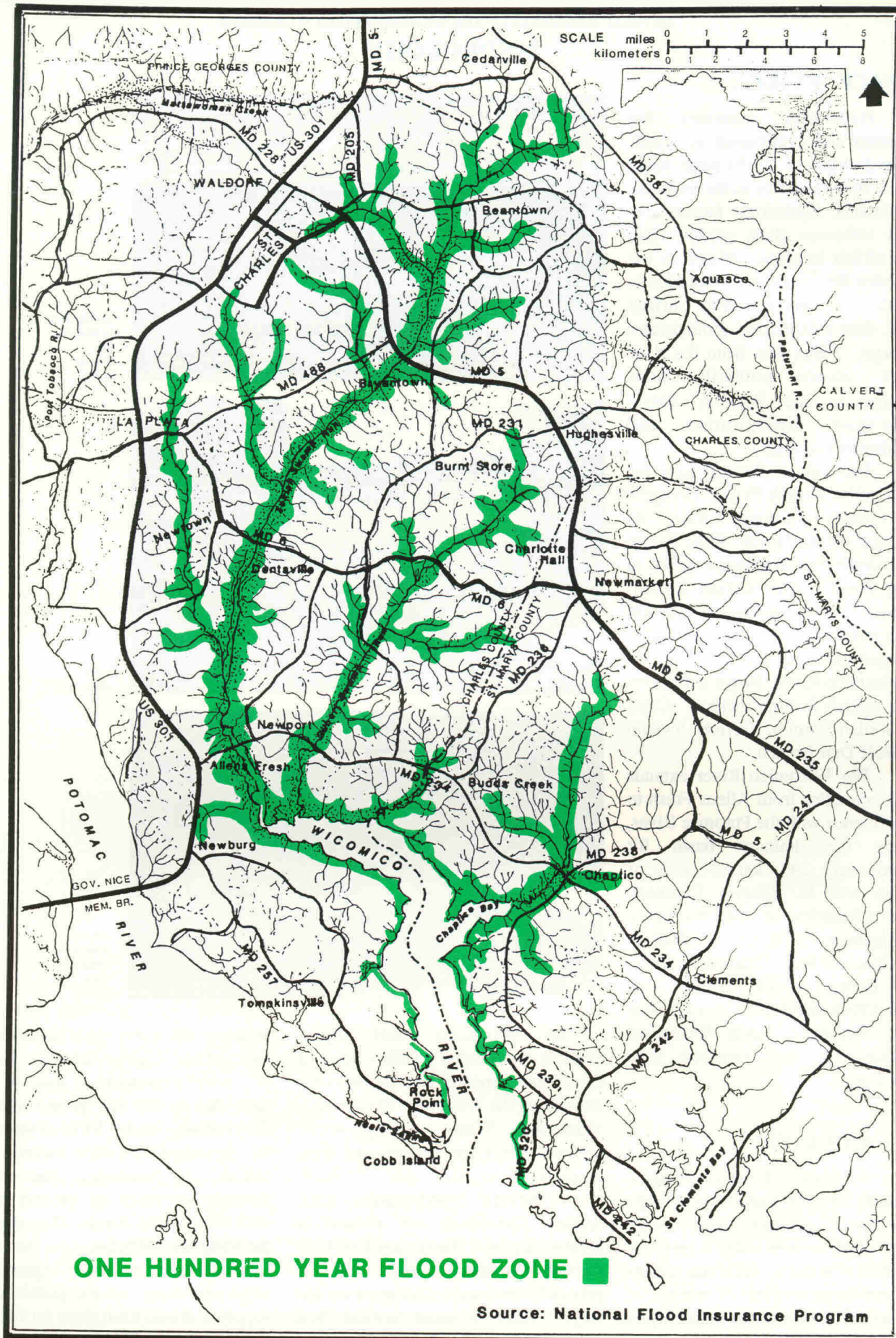
of the Wicomico River region. Shallow water table aquifers occur in the upland deposits and the alluvium underlying the Wicomico River and its tributaries. Water exchange occurs between the river system and these aquifers.

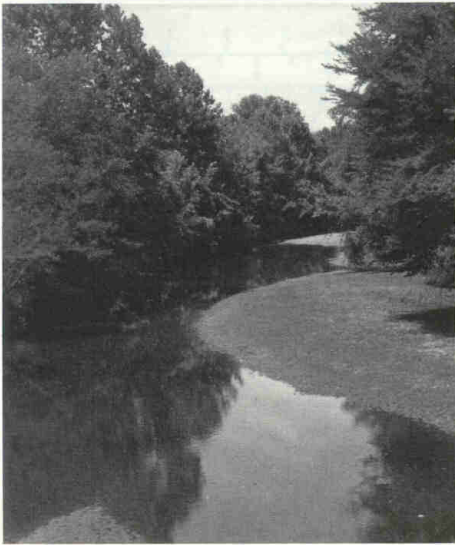
Several additional water bearing formations are present at greater depths. These aquifers have formed in sand deposits and are generally confined by layers of silt and clay. There is some vertical flow

between the water table aquifers and the confined aquifers, although the rate of vertical movement of water is very slow due to the low permeability of the confining units. Most of the water in the deep aquifers enters from outside the watershed and moves through the area as ground water underflow. The Aquia, Magothy and the Patapsco formations are the major confined aquifers in the region.⁵ A large percentage of the public water supply is drawn from these formations.

GROUNDWATER

A body of unconsolidated sediments or rock that is sufficiently permeable to conduct ground water and to yield economically significant quantities of water to wells and springs is known as an aquifer. A number of aquifers exist in the sedimentary layers





Zekiah Swamp Run.

WETLANDS

Wetlands are complex natural systems in which water typically covers or saturates an area for long periods during the growing season. The water causes soils to reach an anaerobic or oxygen depleted state. This leads to the establishment of plants known as hydrophytes. Hydrophytes can tolerate anaerobic soil conditions that result from long inundation or saturation. The United States Environmental Protection Agency defines wetlands as "those areas that are inundated or saturated by water at a frequency and duration sufficient to support, and that under normal conditions do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas".

Recent scientific research has established that wetlands perform many critical ecological functions. When flood waters move through wetlands, they are temporarily retained by dense stands of vegetation. The excess water is then slowly released downstream or into the groundwater. The dense vegetative cover also helps to prevent soil erosion and to trap excess sediment and nutrients such as nitrogen and phosphorus that run off from upland areas. Heavy metals are accumulated in wetland soils where

they are rendered insoluble by attachment to soil particles. This prevents these substances from entering the food chain. Wetlands also provide critical habitat for many wildlife species, particularly waterfowl.

The U.S. Fish and Wildlife Service has developed a hierarchical classification system to categorize wetland types. At the highest level, wetlands are divided into five systems. The marine system consists of areas exposed to ocean waters. The salinity concentration in marine systems is at least 30 ppt. Estuarine systems have salinity concentrations between 30 ppt and 0.5 ppt. Salt and brackish marshes are examples of estuarine systems. Riverine systems contain areas within stream channels where there is at least periodic flow. The lacustrine system includes lakes, ponds and reservoirs that occur in a topographic depression or result from a dammed river channel. The palustrine system includes non-tidal swamps, marshes and bogs. Both palustrine and riverine wetlands are associated with the Zekiah Swamp. The maximum concentration of ocean derived salts in the riverine, lacustrine and palustrine systems is 0.5 ppt.

Wetlands are commonly referred to as tidal or non-tidal. Tidal wetlands include all of the marine and estuarine systems as well as some components of the riverine system. The palustrine, lacustrine and a majority of the riverine systems are non-tidal wetlands. Charles County has 15,510 acres of non-tidal wetlands while St. Mary's County contains 3,470 acres.⁶ Tidal wetland acreage for Charles County is 5,769 and for St. Mary's County 4,176.⁷ (See Map: Wetlands of Special State Concern.)

ESTUARINE PROPERTIES

An estuary is defined scientifically as "a semi-enclosed body of water that has a free connection with the open ocean and within which sea water is diluted with fresh water derived from land drainage". The Wicomico River is a component of the

Potomac River and Chesapeake Bay estuarine systems.

Water circulation in an estuary is determined by the combined effects of tidal currents, wind induced turbulence, the geometry of the estuarine basin and non-tidal currents established by fresh water flushing through the basin. Salinity and temperature gradients form in estuaries as a result of the water circulation process.

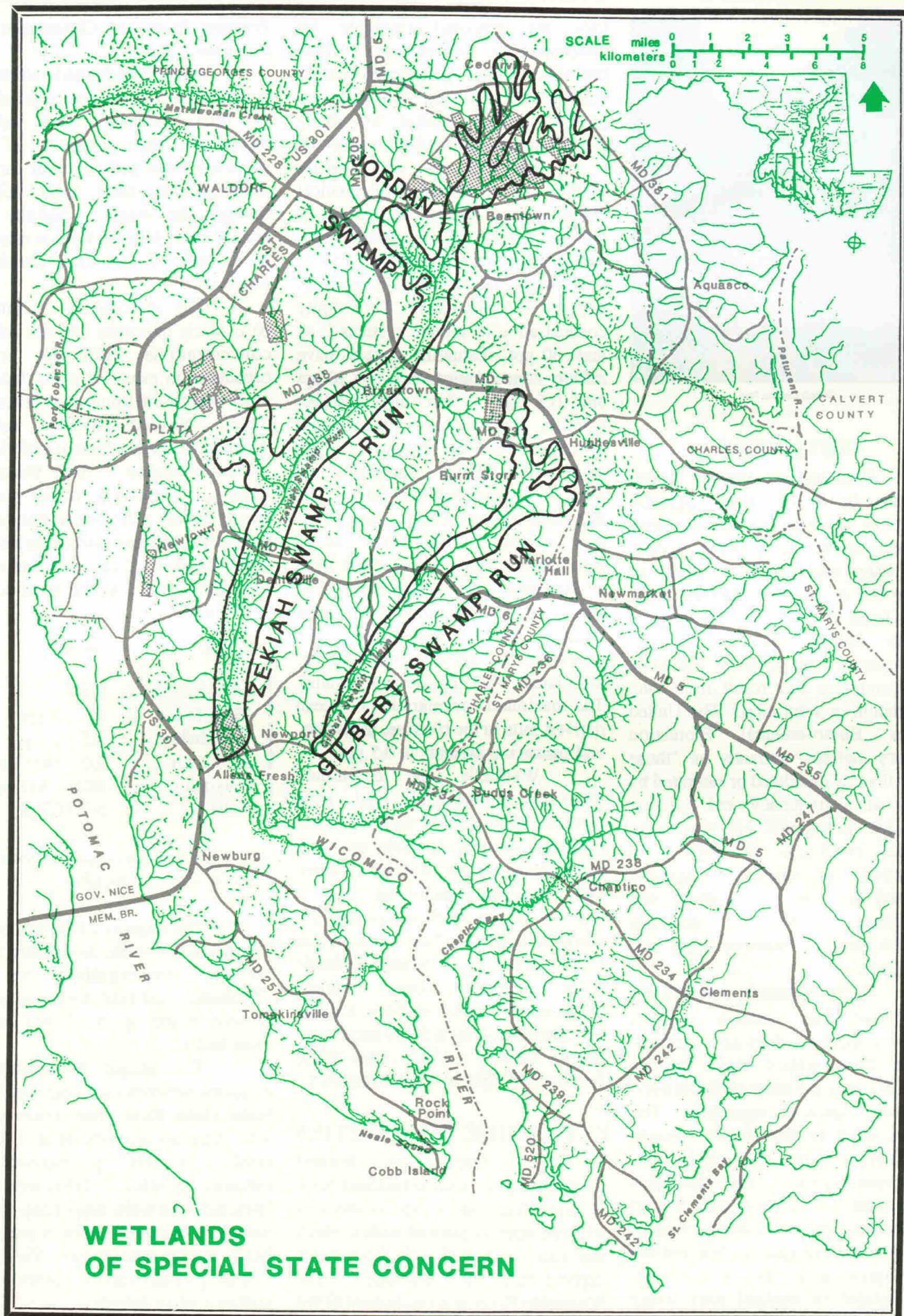
The distribution of salts is particularly important because salinity concentrations influence living organisms in estuaries more than any other natural environmental factor. In highly stratified estuaries, salinity differences occur predominantly in the vertical direction. The Wicomico River is a partially mixed estuary where salinity increases steadily down the basin.⁸ Salinity concentrations are generally grouped in zones that range from fresh water to the open ocean. (See Table)

<u>Zones</u>	<u>Salinity</u>
Non-tidal Fresh	0 ppt
Tidal Fresh	0 - 0.5 ppt
Oligohaline	0.5 - 5.0 ppt
Mesohaline	5.0 - 18.0 ppt
Polyhaline	18.0 - 30.0 ppt
Euhaline	> 30.0 ppt

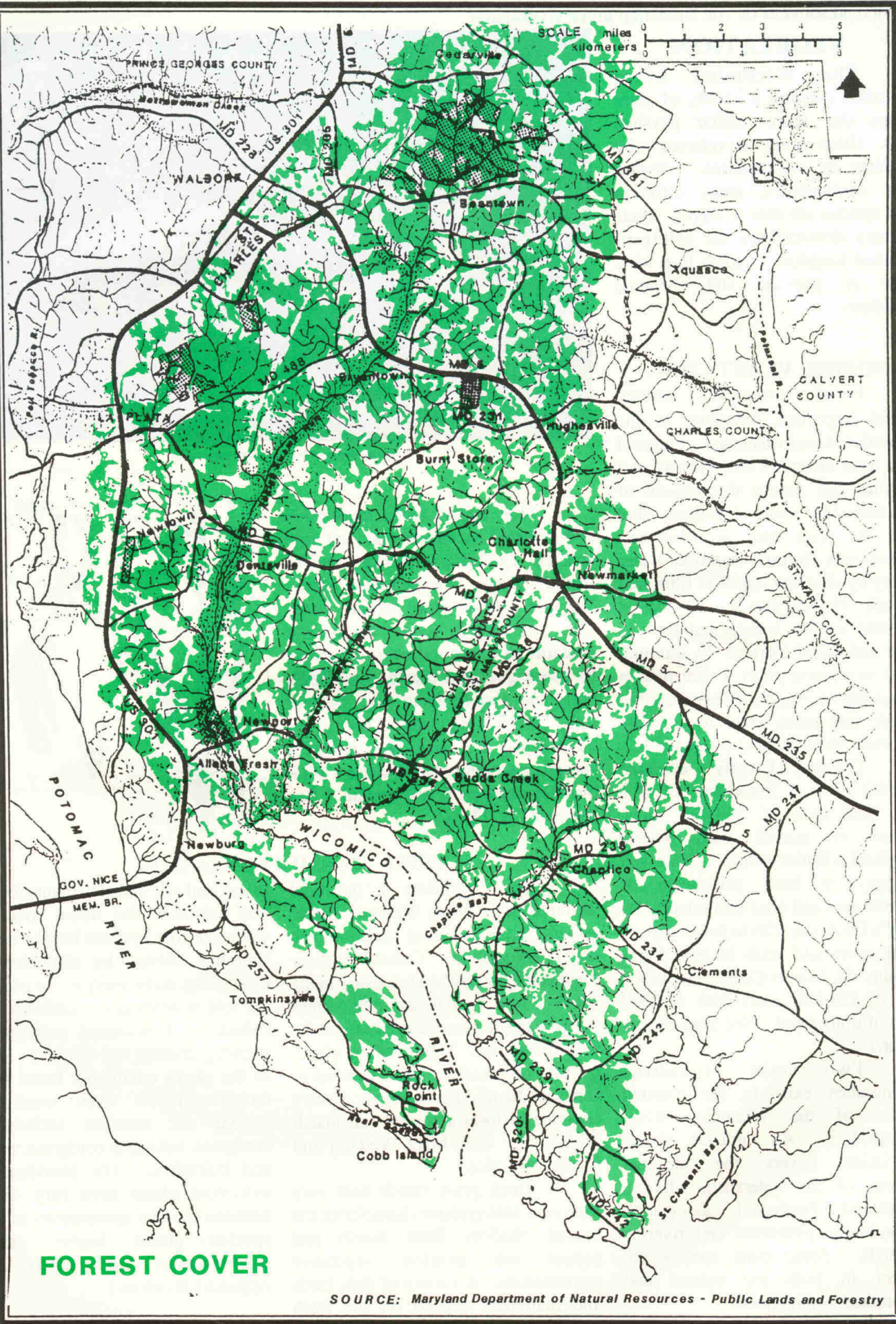
(ppt = parts salt per thousand parts of water by weight)

The majority of the Wicomico River falls within the mesohaline zone. Salinity concentrations in the oligohaline and tidal fresh zones are present in the upper reaches of the river basin.

The unique positioning of estuaries between the ocean and fresh water make them areas where many vital nutrients are concentrated. As a result, biomass productivity in estuarine systems is extremely high. Intricate food webs supporting a wide variety of organisms exist in estuaries. Many marine species have life cycles that are partially carried out within the confines of an estuary.



WETLANDS OF SPECIAL STATE CONCERN



VEGETATION

The Wicomico River watershed contains a variety of plant groups that share similar physical areas. These groups are referred to by botanists as communities. Within these communities, many different plant species are able to thrive. Their diversity demonstrates the ability of the plant kingdom to adapt to a wide range of physical and chemical conditions.

FOREST VEGETATION

Forest vegetation serves several important functions in the Wicomico River watershed. Forested areas have extensive root systems and canopies that reduce the amount of sediment and other pollutants that enter the river and its tributaries. Stream side forests improve water quality by allowing runoff to filter into the soil. Forests also provide habitat for many wildlife species and serve as noise and visual barriers. In addition, forest vegetation plays a vital role in the cycling of oxygen, nitrogen, carbon dioxide and many other biologically important elements and compounds.

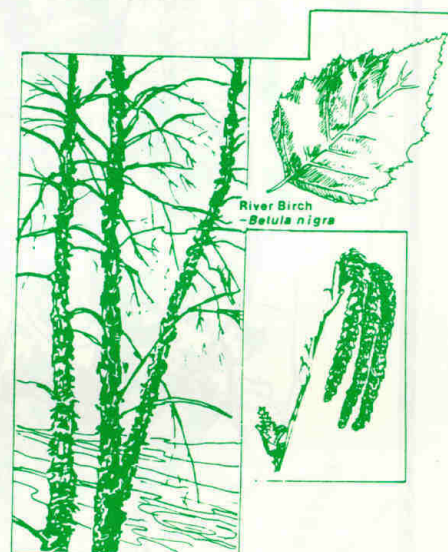
Charles County contains 175,000 acres of forestland out of a total land area of 289,000 acres. Charles is ranked third among Maryland counties behind Garrett and Allegany in both percentage of forested area and total timberland. St. Mary's County is fifth in percentage of forest cover and sixth in total forest acreage. St. Mary's County has a total area of 238,400 acres with 128,000 acres of timberland.⁹ (See Map: Forest Cover.)

Two main vegetative communities exist in the forested regions of the Wicomico River watershed. An upland forest association covers the elevated portions of the watershed, while a bottomland hardwood association exists in the palustrine and riverine wetlands. Some plant species are present in both the upland and bottomland communities.



Zekiah Swamp Run in Cedarville State Forest.

The upland forest association is dominated by various oak and pine species. Common understory species include poison ivy, mountain laurel, Virginia creeper and various ferns. The bottomland forest community contains an overstory layer dominated by sweet gum, red maple, river birch, holly and swamp white oak. Swamp rose, arrowhead, smartweeds and buttonbrush are shrub and emergent species commonly found where a thick overstory canopy is not present. (See Appendix B, Flora.)

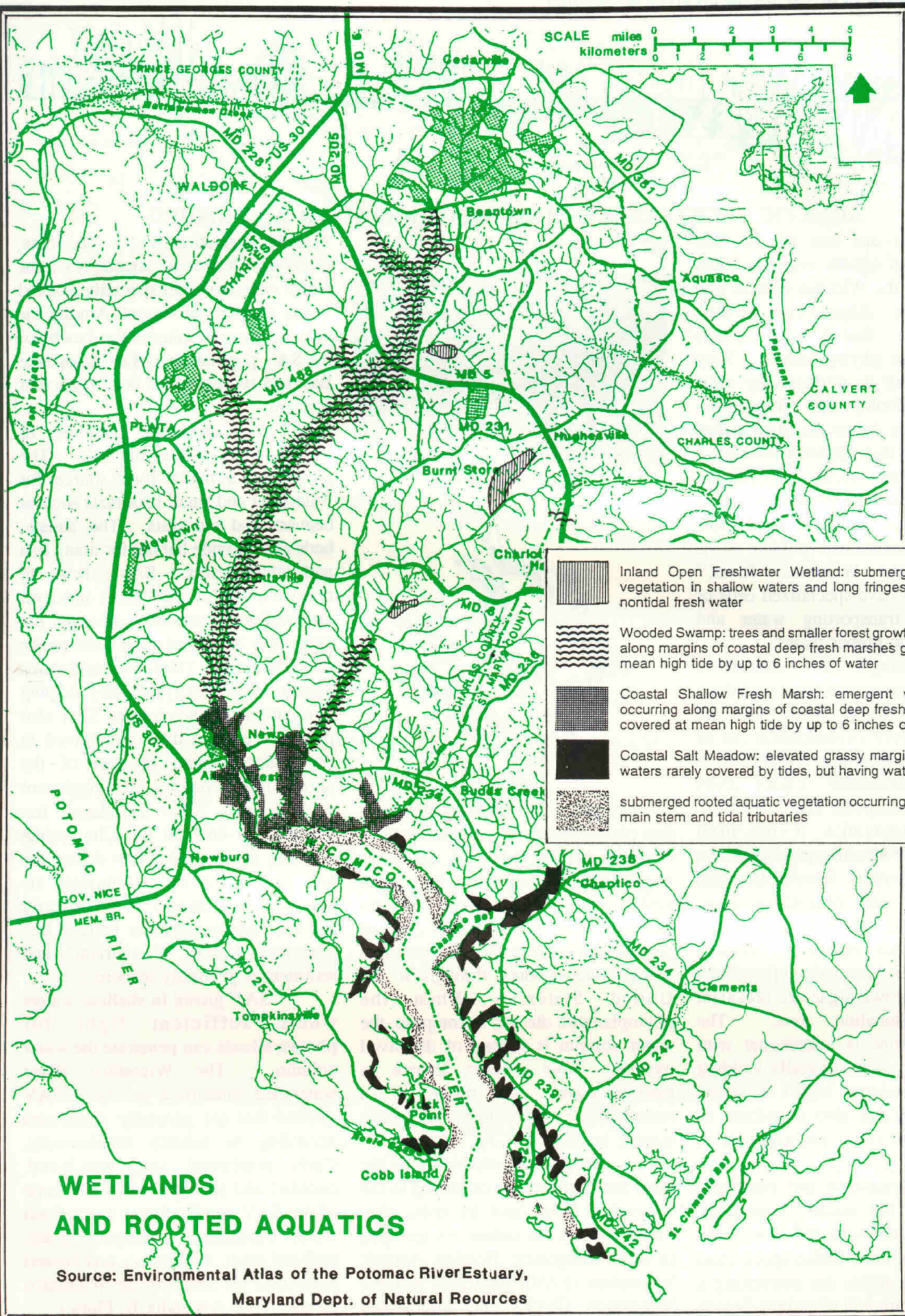


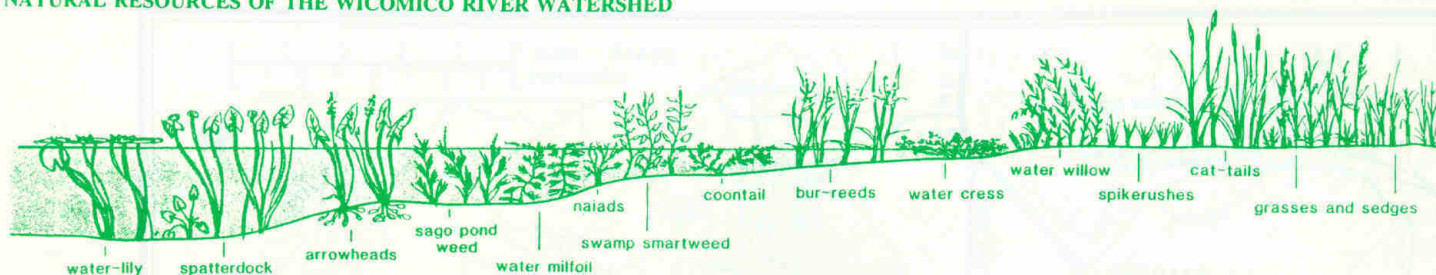
TIDAL MARSH VEGETATION

The vegetation in the tidal wetlands of the upper Wicomico River estuary forms a coastal shallow fresh marsh association. Coastal shallow fresh marsh vegetation is located in the Allens Fresh region and other areas where salinity concentrations are in the tidal fresh zone. Tidal wetland plants in the oligohaline and mesohaline zones of the middle and lower estuary combine to form a coastal salt marsh association. (See Map: Wetland and Rooted Aquatics.)

Thick grass stands with very extensive root systems characterize the coastal shallow fresh marsh and coastal salt meadow vegetative communities. A variety of fish, birds and mammals depend on the fresh

marsh and salt meadow plants for food and habitat. The dense cover and extensive root systems help to control shoreline erosion by absorbing and dissipating wave energy. In addition, the root systems also contribute to the reduction of sediment pollution by trapping eroding soil particles. Some of the plants commonly found in the coastal shallow fresh marsh and coastal salt meadow include big cordgrass, saltmarsh cordgrass, cattails and bulrushes. The abundance of individual plants does vary slightly between the two associations as some species prefer higher salinity concentrations than others. (See Appendix B, Flora.)





AQUATIC VEGETATION OF THE WICOMICO RIVER WATERSHED

Algae are one of the two major types of aquatic vegetation that are found in the Wicomico River and its tributaries. Algae occur as tiny, single-celled, free-floating plants referred to as phytoplankton. They can also occur as multicellular units forming colonies of filamentous chains. These forms are often called seaweeds and may appear as clumps or mats covering rocks or pilings. Excessive growth of the seaweed *Ulva lactuca*, commonly called sea lettuce, has been an occasional problem at the mouth of the Wicomico River.¹⁰ Algae do not have specialized cells or tissues for transporting water and nutrients as do higher plants.

Although no extensive phytoplankton surveys have been done of the Wicomico River and its tributaries, species composition can be inferred from information gathered in other environmentally similar areas within the Chesapeake Bay watershed. Salinity concentration is the main physical factor affecting phytoplankton species distribution. Species from the green algae and blue-green algae divisions are dominant in fresh water and tidal fresh regions. Diatoms, dinoflagellates, blue and red flagellates and golden brown algae are prevalent in the mesohaline zone. The oligohaline zone is transitional with fresh water species gradually yielding to those that tolerate higher salinities. Euglenoid species also contribute to the oligohaline phytoplankton community.¹¹

Phytoplankton are extremely important to the aquatic ecosystem. These tiny plants form the base of the food chain for most finfish species and are also responsible for converting a considerable amount of carbon dioxide



Mouth of the Wicomico River.



into oxygen. It is important, however, that phytoplankton populations remain at their natural level as excessive growth can severely stress an aquatic system. Phytoplankton blooms resulting from increased nitrogen and phosphorus loading have occurred in many water bodies throughout the United States. When the phytoplankton die and decompose, the water column is robbed of dissolved oxygen. This process, known as eutrophication, can result in a reduction or total loss of usable aquatic habitat.

Aquatic vascular plants are the other major plant type occurring in the Wicomico River and its tributaries. These species are commonly grouped in three categories: Floating Aquatic Vegetation (FAV), Emergent Aquatic Vegetation (EAV) and Submerged

Aquatic Vegetation (SAV). The roots, stems and leaves of aquatic vascular plants contain tissues specially adapted to the water environment. Among the aquatic vascular plants, the health of the SAV population in the Chesapeake Bay and its tributaries is of particular concern.

SAV performs a number of important ecological functions. The plants are a major food source for waterfowl and small mammals such as beavers and muskrats. The aquatic beds also provide habitat for many fish and invertebrates. SAV helps to remove some of the excess nutrients and sediment currently entering the Wicomico River and other Chesapeake Bay tributaries. The leaves and stems absorb wave energy, thereby helping to reduce shoreline erosion. SAV also produces oxygen that is dissolved in the water column as part of the photosynthetic process. It is important to note that SAV abundance has dropped by 66% in the Chesapeake Bay and its tidal tributaries during the last twenty years.¹² Although the cause of this decline is not exactly known, most researchers believe that increased loading of nutrients and sediment is primarily responsible.

SAV grows in shallow waters where sufficient light for photosynthesis can penetrate the water column. The Wicomico River watershed contains a variety of SAV species that are generally distributed according to salinity requirements. Curly pondweed, sago pondweed, coontail and southern naiad are some of the SAV species found in the fresh water tributaries. Widgeon grass, redhead grass, wild celery and horned pondweed are found in the Wicomico estuary. (See Appendix B, Flora.)

WILDLIFE

Rivers and their adjacent lands are important to wildlife for several reasons. They provide vital food sources, habitat for shelter and breeding, and serve as migratory routes for some species. The Wicomico River watershed supports many diverse wildlife populations. The species that compose the various wildlife populations are extremely important to the natural balance of the watershed as well as a valuable recreational resource.



Wild geese in Allen's Fresh Marsh.

WATERFOWL AND OTHER BIRDS

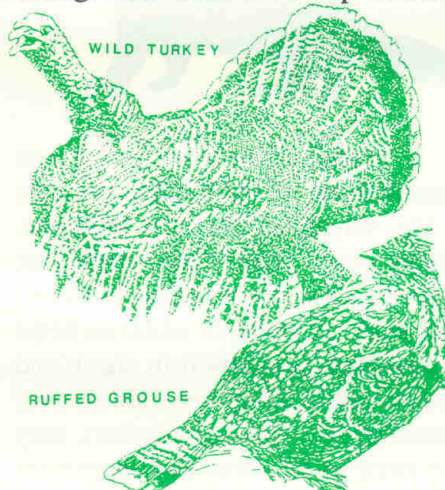
Many species of birds inhabit the Wicomico River watershed. These include native residents that live and breed in the region as well as migrant species. Among the birds found in the watershed are waterfowl, birds of prey, rails, waders, songbirds and perching birds. (See Appendix C, Fauna.)

Waterfowl are drawn to the Wicomico River watershed by an abundance of high quality habitat. They feed primarily on the tubers, seeds, roots and foliage of submerged and emergent aquatic vegetation. Dabbling ducks found in the area include mallards, black ducks, wood ducks, greenwing and bluewing teal. Canvasback ducks and diving ducks such as greater scaup and lesser scaup are also common. Canada geese and tundra swans are migratory species that utilize the watershed as a wintering ground. Hunting of waterfowl is a popular recreational pursuit along the Wicomico River and has been valuable source of income to the local economy.

Birds of prey that inhabit the region include owls, hawks, ospreys and bald eagles. Charles and St. Mary's Counties are home to thirteen nesting pairs of bald eagles. Three of these pairs reside in the Wicomico River watershed.¹³ The bald eagle and osprey populations have both shown increases in recent years. Most buoys and channel markers in the river have been made into nesting platforms

by ospreys and many local residents have erected osprey nesting platforms.

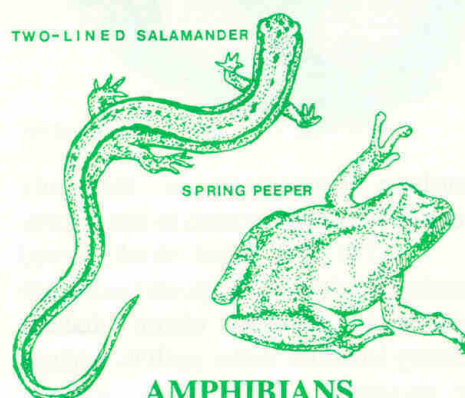
Other birds which can be found in the Wicomico River watershed include the Virginia, king and sora rails. These are secretive birds that utilize the tall marsh grasses for habitat. Woodcock can be found feeding in the forested wetlands and performing their aerial breeding ritual in open fields during the spring. Numerous songbirds utilize the forests, fields and marshes for nesting and feeding. The Zekiah Swamp was the



WILD TURKEY

RUFFED GROUSE

site for releases of translocated wild turkey and ruffed grouse during the winter of 1990-1991. It is expected that both of these species will establish breeding populations and eventually expand throughout Southern Maryland. Herons, egrets and shorebirds are often seen feeding in the mud flats and shallow waters of the Wicomico River and its tributary creeks.



TWO-LINED SALAMANDER

SPRING PEEPER

AMPHIBIANS AND REPTILES

Many reptiles and most amphibians require water as part of their life cycle. The wooded wetlands and freshwater marsh of the Zekiah Swamp and the tidal marshes of the Wicomico River provide a diversity of habitats for many species of reptiles and amphibians. (See Appendix C, Fauna.)

Most of the amphibians are found in the freshwater wetlands and marshes of the watershed. Several varieties of frogs including spring peepers, green tree frogs and bullfrogs can be heard calling in the Zekiah Swamp on spring and summer evenings. Undisturbed areas of upland forest with accumulated leaf litter and rotting fallen trees are home to the dusky, two-lined and redback salamander.

Reptiles found throughout the watershed include a large variety of snakes, skinks and turtles. At least a dozen species of snakes utilize the

AMPHIBIANS AND REPTILES

various habitats found along the river and throughout the swamp. Included among these are the northern water snake, black rat snake, black racer, garter snake and hognose snake. The

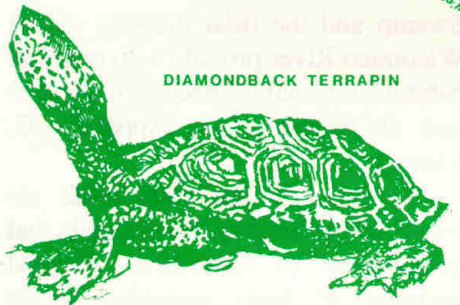


COPPERHEAD

northern copperhead is the only venomous snake located in the region.

The five lined skink, broad headed skink and the ground skink are terrestrial animals whose habitat usually includes water such as springs or swamps. They forage actively during the day on insects and take shelter under stones and decaying logs.

A celebrated resident of the Wicomico River is the Northern

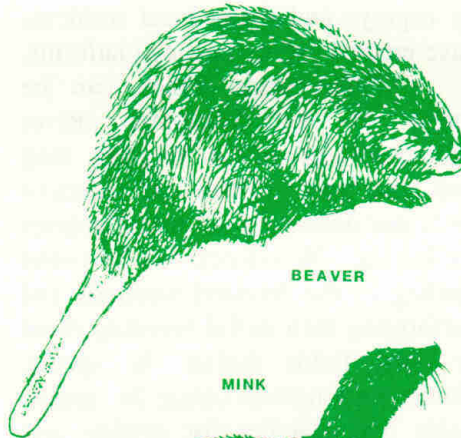


DIAMONDBACK TERRAPIN

Diamondback Terrapin. The University of Maryland mascot inhabits brackish water marsh, feeding on fish, crustaceans, mollusks and insects. The watershed is also home to the musk, spotted, painted and snapping turtles.

MAMMALS

The plentiful food resources, access to water and remoteness from intensive human activity makes the upland forests, bottomland swamps and tidal marshes of the Wicomico River watershed attractive to numerous species of mammals. White-tailed deer, grey and red foxes, grey squirrels, cottontail rabbits, raccoons, opossums and groundhogs are some of the large mammals that inhabit the region. Several species of mice, rats, voles, shrews and bats add to the mammalian diversity of the area. (See Appendix C, Fauna.)



BEAVER

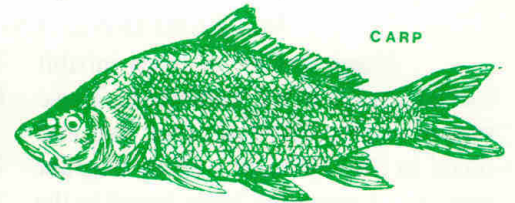


MINK

Aquatic furbearers are an important part of the wildlife resource of the Wicomico River. Muskrats, beaver, river otter and mink are trapped each winter and their pelts and meat sold. Trapping of muskrats helps to keep their population in check and prevent marsh grass loss due to over consumption. Beaver numbers may also need to be controlled to prevent damming of streams and subsequent loss of access to spawning areas for anadromous fish. The muskrat consumes small invertebrates, insects, birds and fish in addition to marsh vegetation. Beavers survive on a vegetarian diet while river otters are strictly carnivores.

FINFISH

The varying physical and chemical conditions that exist in the Wicomico River and its tributaries support a diverse finfish population. Although many environmental factors determine the distribution of finfish species, salinity concentration has the greatest influence. Most finfish occupy a position near the top of the aquatic food chain. As a result, the presence of toxins and other water pollutants are often visible through the monitoring of finfish populations. (See Appendix D, Finfish.)



CARP

FRESHWATER FISHERIES

Freshwater fishes are indigenous to the tributaries of the Wicomico River. Many of these species regularly descend into the tidal fresh regions. Spawning, however, is generally restricted to non-tidal waters and primarily occurs in late spring to early summer. Carp, white catfish, bluegill and largemouth bass are some of the freshwater fishes found in the watershed.

ESTUARINE FISHES



MUMMICHOG

Estuarine fishes are those species that are residents of tidal waters with salinity concentrations less than 30 ppt. Some estuarine fish occasionally stray into non-tidal fresh water of coastal ocean areas. Spawning generally takes place in late spring and throughout summer. Estuarine species that have been located in the Wicomico River include striped killifish, mummichog, inland silversides, Atlantic silversides, bay anchovies and oyster toadfish.

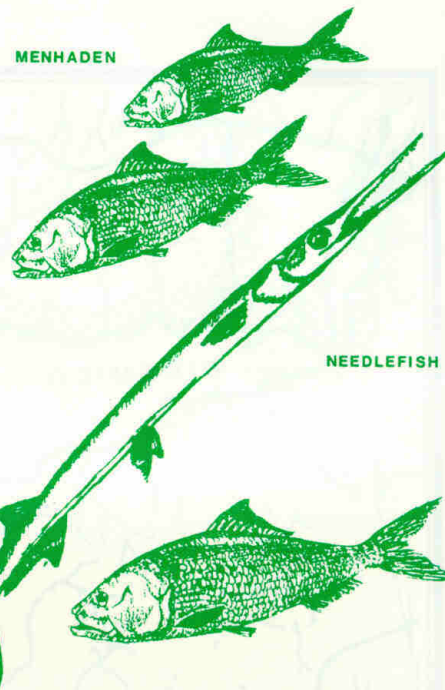
ANADROMOUS, CATADROMOUS AND MARINE FISHES

Fish that are considered anadromous, catadromous or marine utilize the ocean during some portion of their life cycle. Anadromous fish are those that spend most of their lives in the ocean but spawn in fresh water. Observed anadromous species in the Wicomico watershed include blueback herring, alewife and American shad. These members of the herring family spawn from March through June with the alewife spawning first, followed by the blueback herring and American shad. Catadromous fish are those that complete most of their life cycle in

fresh or estuarine waters but spawn in the open ocean. The American eel, which spawns in the Sargasso Sea, is the only catadromous species indigenous to the Wicomico River.

Many marine fish use the Wicomico River estuary during part of their life cycle while others are transients. Marine species such as bluefish, spot, needlefish and Atlantic menhaden use the river as a nursery and feeding ground. Striped mullet, Spanish mackerel, striped anchovy and harvestfish are species that occasionally enter the Wicomico River.

MENHADEN



NEEDLEFISH

SEMI-ANADROMOUS FISHES

Semi-anadromous species spend most of their lives in estuaries but use fresh water areas for spawning grounds. Striped bass, white perch and yellow perch are semi-anadromous fish indigenous to the Wicomico River watershed. These species are highly prized by both commercial and recreational fishermen.

Striped bass use ocean, estuarine and tidal fresh waters during their life cycle. They are found along the Atlantic coast of North America from Canada to Florida, with the Chesapeake Bay region providing the most important spawning grounds. Therefore, striped bass are particularly susceptible to fishing pressures and water quality changes in the Chesapeake Bay and its tributaries.

Prior to the decline of the Chesapeake Bay striped bass stocks in the late 1970's, the contribution of the Bay to the Atlantic coastal striped bass fishery was estimated to be as high as 90%. From 1962 to 1984, the commercial landings of striped bass in the Potomac River constituted 27.7% of the total landings in the Chesapeake Bay. The Wicomico River has not been documented to serve as a spawning ground for striped bass; however, the area has been documented to serve as a nursery for young-of-year.

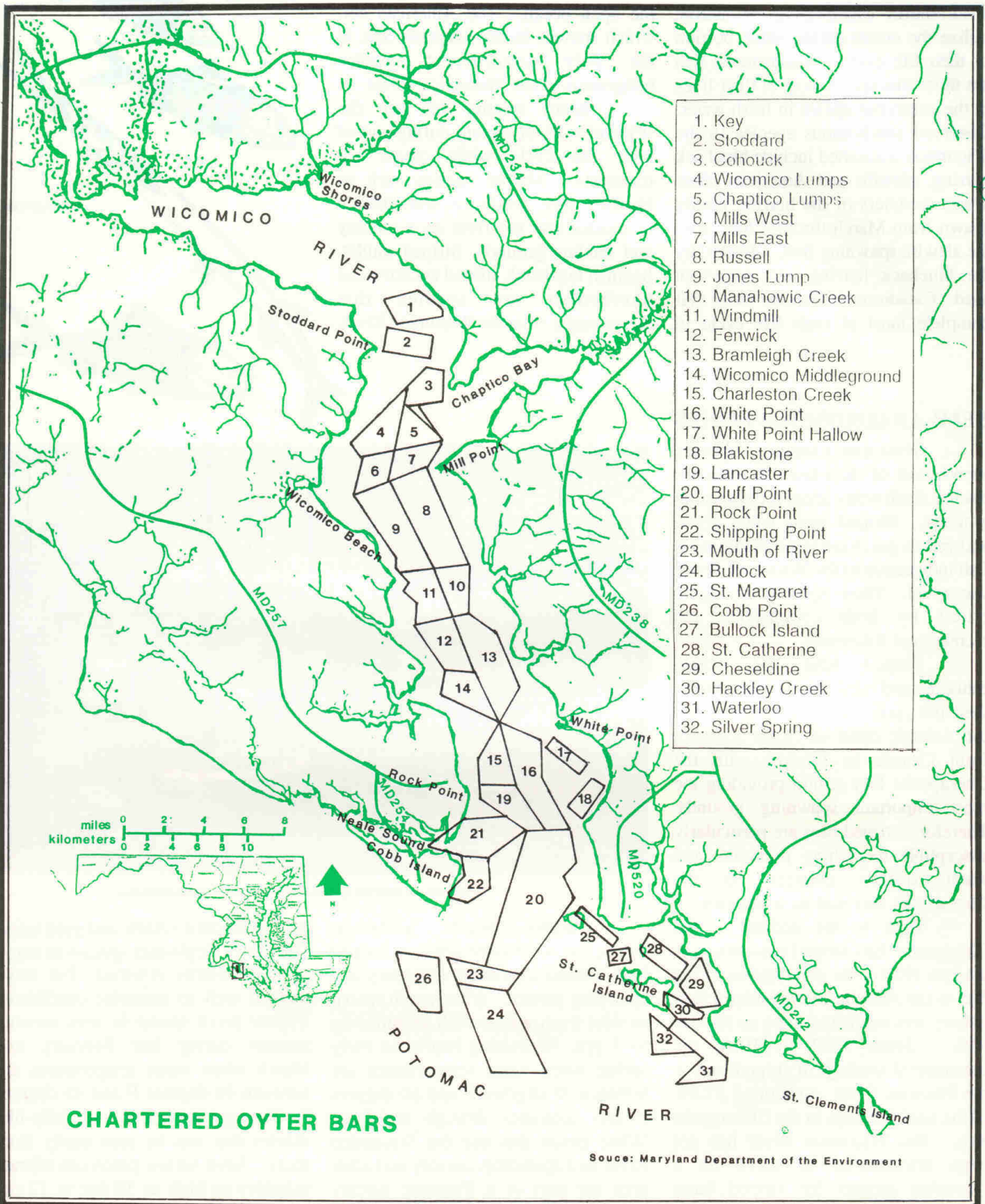


Commercial and sport fishing boats in Neale Sound on the Wicomico River.

White perch, although belonging to the same genus as striped bass, exhibit a different migratory and spawning pattern. White perch spawn in tidal fresh waters with salinities up to 2 ppt. Spawning begins in early spring when water temperatures are between 45 degrees F and 50 degrees F and continues through mid-June. White perch that use the Wicomico River as a spawning, nursery and adult area are part of a Potomac estuary population that is distinct from other regions of the Chesapeake Bay.¹⁴

Yellow perch are known for

their distinctive yellow and gold body. They are a freshwater species in many parts of North America, but have adapted well to estuarine conditions. Yellow perch spawn in slow moving streams during late February and March when water temperatures are between 40 degrees F and 45 degrees F. The eggs are laid in long, jelly-like masses that can be seen easily from shore. Adult yellow perch can tolerate salinities as high as 10 ppt to 12 ppt although they prefer lower concentrations.¹⁵



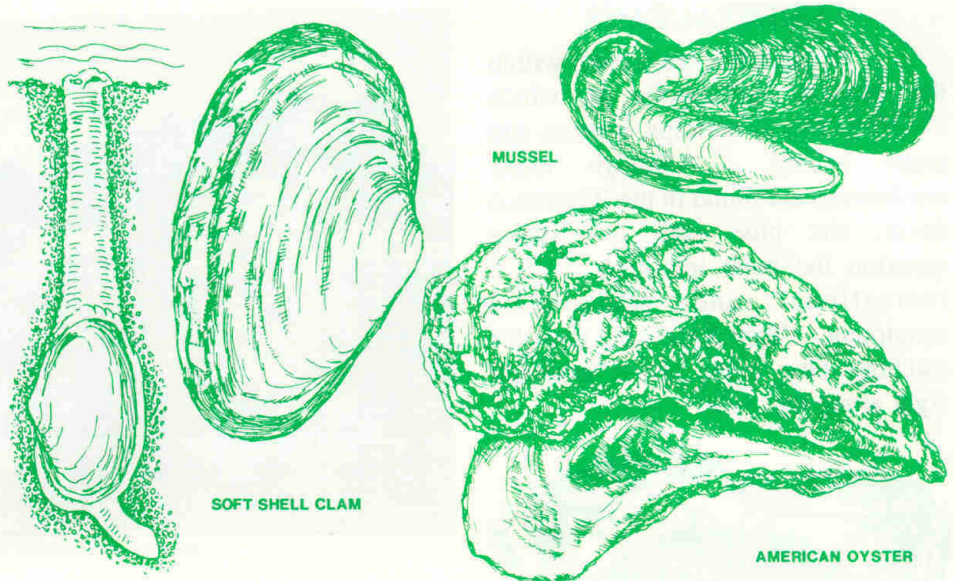
SHELLFISH

Shellfish is a term used to refer to a variety of commercially important invertebrates that are covered by a chitinous or calcareous shell. Three species, the soft shell clam *Mya arenaria*, the American oyster *Crassostrea virginica* and the blue crab *Callinectes sapidus*, are native to the Wicomico River. Blue crabs and American oysters are a valuable source of revenue to the economies of St. Mary's and Charles Counties as well as a recreational resource for many local residents.

MOLLUSCS

The soft shell clam and the American oyster, as well as numerous other species of clams, oysters and mussels, belong to a class within the phylum Mollusca known as the bivalves. The bodies of bivalves are enclosed in two hinged shells or valves. Muscles attached to the inside of the shell allow the bivalve to open or close its shell in response to changing conditions. Most bivalves have two tubular siphons. One brings water and food particles into the body cavity. The other discharges wastes and water. Bivalves filter tremendous quantities of water through their siphons. As a result, toxins and pathogens that are present in the water tend to accumulate in bivalve tissues.

The American oyster is the most sought after bivalve in the Wicomico River as well as the Chesapeake Bay. Oysters spawn when water temperatures are between 68 degrees F and 86 degrees F. Once fertilization occurs, oysters undergo two planktonic larval stages that last for 2 to 3 weeks.¹⁶ The larvae then migrate to the bottom where they adhere to a substrate, usually old oyster shells, and develop into juvenile oysters. Newly settled oysters are referred to as spat and the adhesion process as spat set. The oyster completes its life cycle attached to the substrate.



Salinity and temperature are important factors in oyster growth, reproduction and survival. Larvae will not develop in temperatures below 59 degrees F. Metabolic processes are reduced to a minimum at temperatures below 37 degrees F or above 90 degrees F.¹⁷ Oysters require a salt concentration of 9 ppt to initiate reproduction. During 1972, rainfall from Hurricane Agnes dropped the salinity level in the Wicomico River to approximately 5 ppt and destroyed most of the oyster fishery. When salinity concentrations returned to normal levels, an intensive re-seeding and shell substrate stocking program was initiated by the State of Maryland. These efforts have led to the

successful recovery of the Wicomico River oyster population. (See Map: Chartered Oyster Bars.)

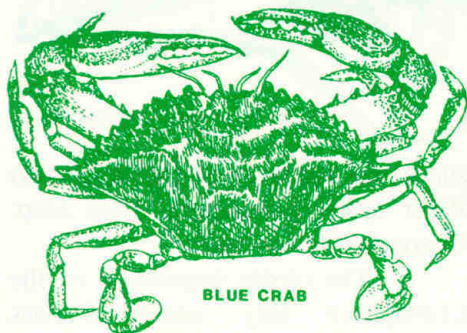
The oyster population of the Chesapeake Bay watershed has suffered high mortality in recent years due to the MSX virus and Dermo protozoan. High salinity regions have seen higher infection rates. The Wicomico River oyster fishery has been relatively unaffected by these diseases and as a result remains one of the most productive in the State. In 1990, MSX infection levels dropped to the point that the virus is not currently considered an immediate threat to the recovery of Maryland's oyster population.



Oyster tonging work boat on the Wicomico River.

CRUSTACEANS

Crustaceans are a class within the phylum Arthropoda to which shellfish such as shrimps, lobsters and crabs belong. Although many crustaceans are found in the Wicomico River, the blue crab is without question the most important from a recreational and commercial standpoint. Trot lines and pots for catching blue crabs are a common sight along the river.



Blue crabs have dark green or brown colored backs and derive their common name from the blue marking on the underside of the claws. They have a complex life cycle that begins with internal fertilization. The mating period lasts from June to October.



Crab pots on the banks of Neale Sound, Wicomico River.

After mating, female blue crabs migrate to spawning grounds in high salinity regions near the mouth of the Chesapeake Bay. Spawning occurs in both autumn and spring. Juvenile blue crabs migrate up the Chesapeake Bay and eventually enter the Wicomico River as well as all other Bay tidal tributaries.

Blue crabs mature quickly, shedding their shells several times in a process called molting. Molting crabs, known as soft shells, are harvested and

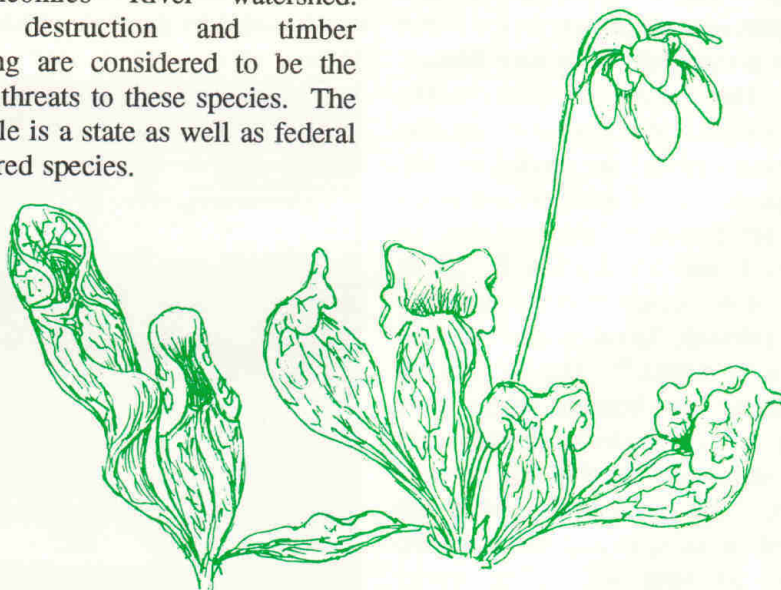
served as a delicacy. Adults average between 12 cm. and 15 cm. in width and feed on small fish, invertebrates, aquatic vegetation and dead organisms. Blue crabs undergo a dormant stage in winter during which they are slightly buried in the bottom mud of deep channel areas. Heavy winter mortality sometimes occurs following summers of high abundances and intense competition for food. Blue crabs generally do not live more than three years.

RARE, THREATENED AND ENDANGERED SPECIES

A nationwide policy of preserving rare species was adopted by Congress in 1973 with passage of the Endangered Species Act. In 1979, the State of Maryland established the Natural Heritage Program under the Department of Natural Resources. The Natural Heritage Program conducts a continuous inventory of the State's natural areas with the goal of locating and preserving rare, threatened and endangered species and outstanding examples of natural communities. (See Appendix E, Rare, Threatened and Endangered Species.)

State biologists have records of eleven plant species of importance to the Natural Heritage Program within

the Wicomico River watershed. Habitat destruction and timber harvesting are considered to be the primary threats to these species. The bald eagle is a state as well as federal endangered species.



NORTHERN PITCHER PLANT - STATE THREATENED

HISTORY AND CULTURAL RESOURCES

INTRODUCTION

The Maryland Scenic and Wild Rivers Act makes specific reference to the importance of preserving and protecting the outstanding historic and cultural values of a designated scenic river and its adjacent lands. Historic preservation may help to maintain the cultural heritage and identity of a

community, serve as an educational tool to teach history, and provide an attraction for tourism and local commerce. The National Park Service, through the Maryland Historical Trust, provides leadership in the development of historic and cultural resources throughout the State.

HISTORY OF SETTLEMENT

PREHISTORIC ERA

Native American history in the Wicomico River region spans three periods prior to 1600; archaeologists have distinguished these subdivisions on the basis of differing cultural components. The following section is a brief summary of what is currently known about each period.¹⁸

Paleoindian Period (10,000 B.C. - 7500 B.C.)

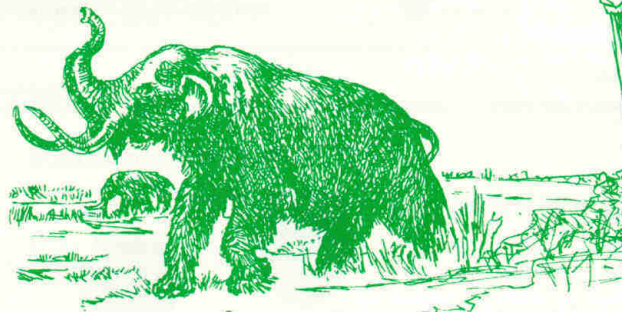
The first evidence of human activity in the Wicomico River region dates from the Paleoindian Period. This period corresponds to the end of the Glacial and the beginning of the Boreal episode. The people of the Paleoindian Period probably survived to a large extent by hunting large mammals including mastodon, mammoth, caribou and moose. Spear points dating from this time are known as clovis points and have been found at Zekiah Swamp.



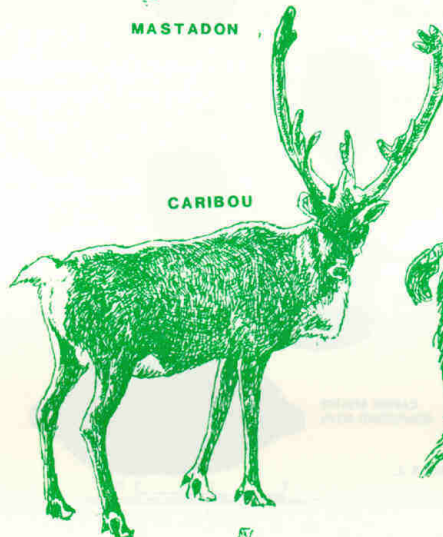
CLOVIS POINT



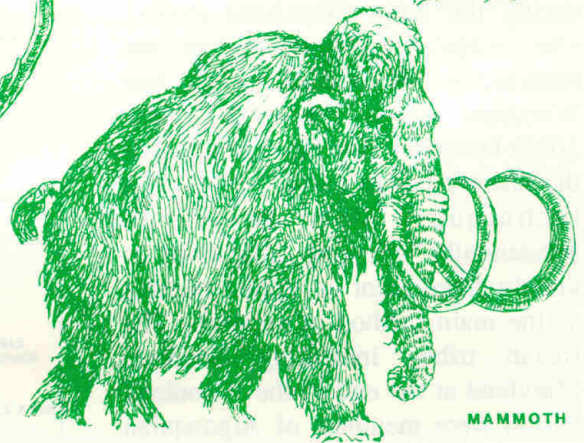
DEER (FAWN)



MASTADON



CARIBOU



MAMMOTH



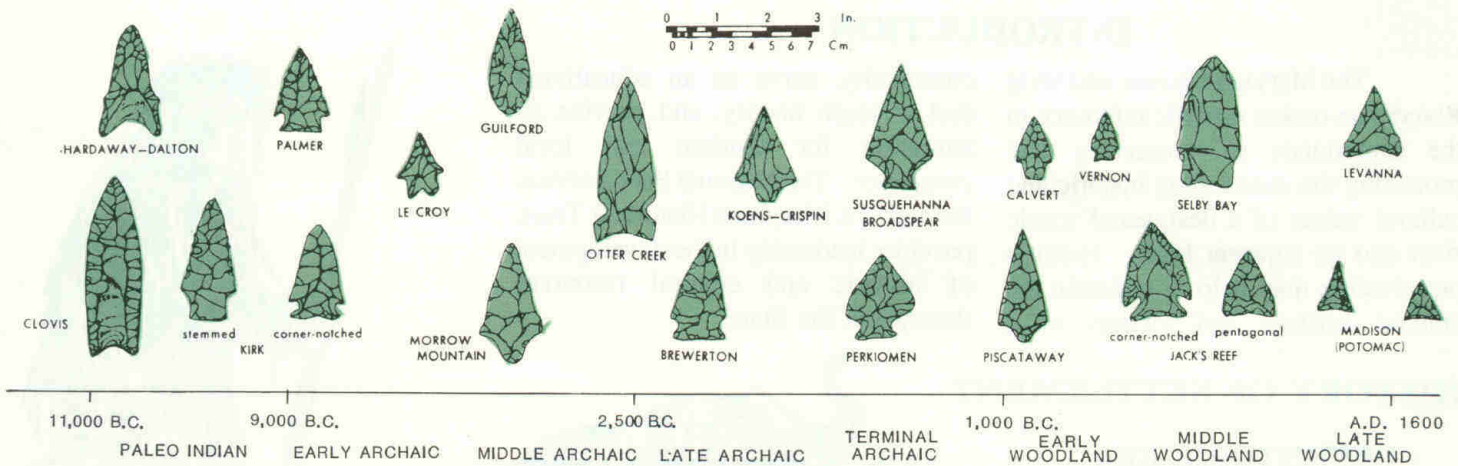
ELK



Archaic Period (7500 B.C. - 1000 B.C.)

Temperature and sea level increases during the Archaic Period contributed to numerous ecological changes in the Wicomico River area. A deciduous forest was established and eventually reached its climax stage. The number of swamps increased. The large mammals of Paleoindian times became extinct or migrated north and were replaced by deer and elk. Human activity and population also increased during the Archaic Period, although a hunting and gathering society remained. The first evidence of prehistoric oyster use dates from approximately 3000 B.C.

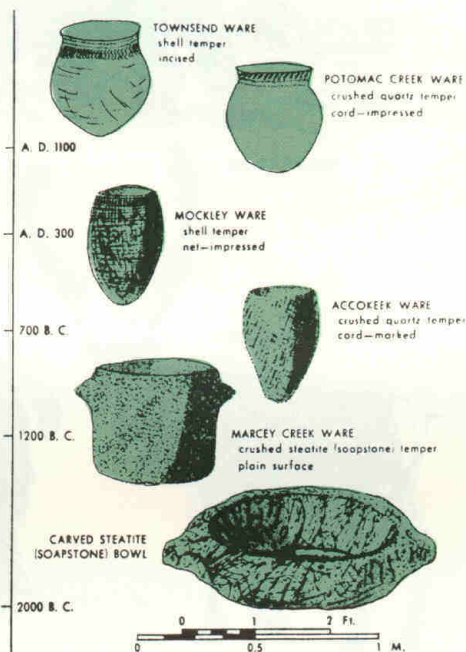
SOME CHARACTERISTIC ARTIFACTS OF INDIAN CULTURES IN MARYLAND



COOKING VESSELS

Woodland Period (1000 B.C. - A.D. 1600)

There was little significant change in social organization or use of resources among Native Americans during the early Woodland Period. One major development was the introduction of pottery. The late Woodland Period (900 A.D. - A.D. 1600) however, saw the formation of the historic Indian tribes. Cultivation techniques also developed substantially, allowing agriculture to greatly supplement or replace hunting as the main method of support. The Indian tribes inhabiting Southern Maryland at the end of the Woodland Period were members of Algonquian groups.



Indian from map Virginia,
Marylandia et Carolina, 1714,
from Papenfuss/Coale, Fig. 25 P. 24.

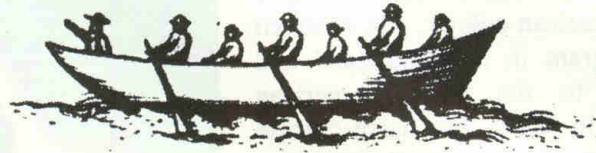
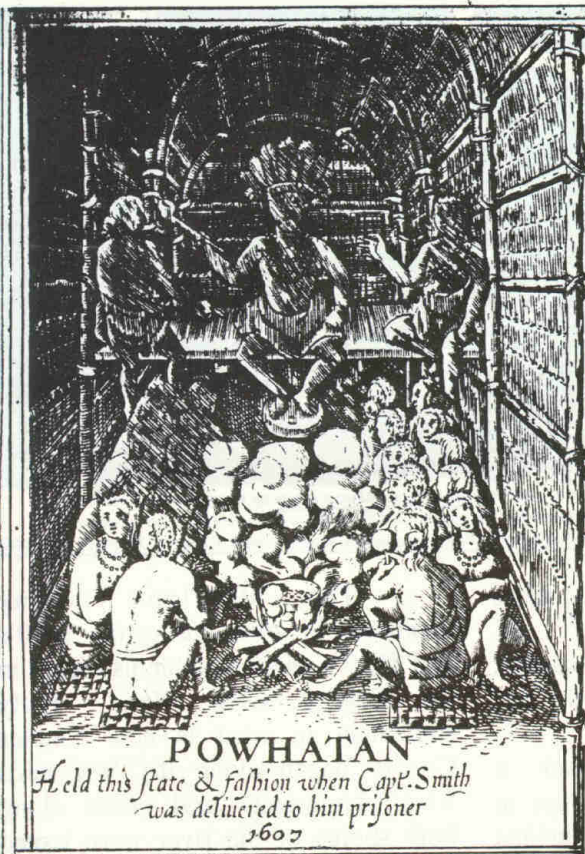
HISTORIC ERA

Colonial and Early American History

The first European to conduct substantial exploration of the tidewater areas of Maryland was Captain John Smith. In 1608, he produced the first written data documenting the resources of the region. Prior to Smith's journey, other Europeans had conducted more limited visits to the Chesapeake Bay area. Sir Ralph Lane, a settler from the Roanoke Island colony in present day North Carolina, is credited with giving the Indian name "Chesepiuc" to the Bay.¹⁹ Although the early explorers did not lead settlers into Maryland, their background research served as an enticement to others.



Indians as pictured on Augustine Herman's map Virginia and Maryland 1670,
from Papenfuss/Coale: *The Hammond-Harwood House Atlas of Historical Maps
of Maryland, 1608-1908*, Fig. 14c p. 14.



*An Indian Canoe made out
 of a Tree with their Battles or
 Oares with the manner of Row
 ing over the Rivers*

15



Cartouche and section of John Smith's map Virginia, 1607. Highlighted is the earliest drawn record of the Wicomico and Choptank Rivers and the "Checomocomoco" Indians' territory. Insert of canoe is from Augustine Herrman, *Virginia and Maryland* Map of 1670. Papenfuss/Coale; *The Hammond-Harwood House Atlas of Historical Maps of Maryland, 1608-1908*, Fig. 1 P.2 and Fig. 14D P.15.

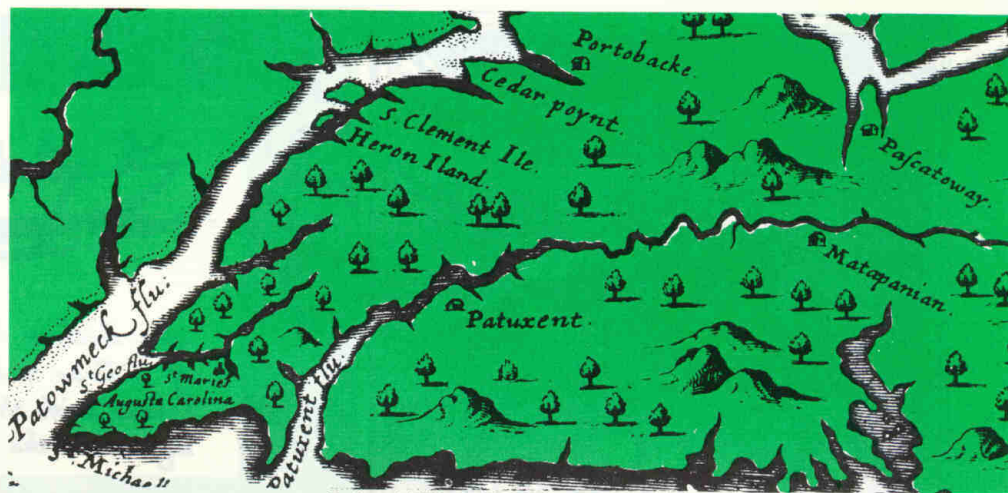
George Calvert, knighted Lord Baltimore I by King James I of England, dreamed of establishing a North American colony. He received a royal grant in Newfoundland and ventured to the North American continent in 1628. The harsh climate proved inhospitable to the settlers. Calvert decided to petition the King for a new charter. Without receiving a reply, he sailed for the Chesapeake Bay region. Lord Baltimore was denied settlement at the Jamestown colony. He returned to Great Britain and died on April 15, 1632. King Charles I decided to grant George Calvert's oldest son, Cecilius, Lord Baltimore II, a charter for territory north of Jamestown in June of 1632.



Cecilius Calvert, 2nd Lord Baltimore (1605-1675), to whom the Charter of Maryland was granted on 20 June, 1632.

Cecilius Calvert named the new colony Maryland, in honor of the King's wife, Queen Henrietta Maria.

Leonard Calvert, Cecilius' brother, was named governor and led the original settling expedition to Maryland. The sailing vessels the Ark and the Dove landed near the mouth of the Wicomico River at St. Clements Island on March 25, 1634. Leonard Calvert met with local Indians and purchased "thirtie miles of ground" for axes, hoes, hatchets and cloth.²⁰ Soon thereafter, the settlers established the third permanent English colony at



Section of 1635 map *Noua Terrae-Mariae tabula* by Hawley/Lewger, identifying "Patowmeck flu," "St. Maries" and Pascataway Indian territory. From Papenfuss/Coale: *The Hammond-Harwood House Atlas of Historical Maps of Maryland 1608-1908*, Fig. 4 P. 6.

St. Mary's City, about twenty miles east of the Wicomico River.²¹ St. Mary's City, Maryland's capital, became the political, economic and cultural center of the colony.

The Europeans found a number of peaceful Indian groups in Southern Maryland. Various Algonquian tribes were organized into a loose trading and commerce confederacy called the Conoy. Of these tribes, the Piscataway were the most numerous. Friendly relations and cooperation developed between the local Indians and the colonists, as witnessed by some agreements about settlement. In 1680, the Piscataway constructed a fort in Zekiah Swamp²²; however, the exact location is not currently known. Warfare with the northern Susquehannock and Iroquois tribes, colonial expansion and contact with European diseases led to the rapid depopulation of Southern Maryland Indian groups.



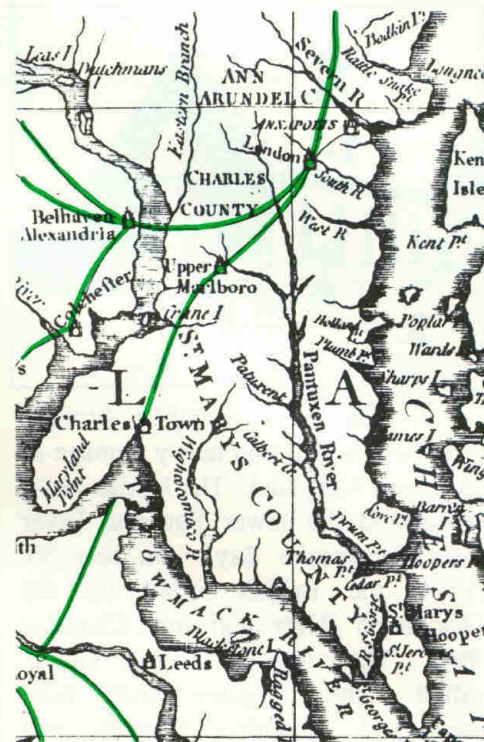
Sailing Vessel of 1670 from Augustine Herman's map *Virginia and Maryland*. Papenfuss/Coale, Fig. 14c P. 44.

The Maryland colony continued to grow during the 1640's and 1650's despite problems rooted in the English Civil War. Early settlement in what is now Charles County began along the Wicomico River. Numerous land grants along both shores of the river were issued during the period from 1640-1680. South of present day Bushwood, Philip Key, the great-grandfather of Francis Scott Key, constructed Bushwood Lodge. Captain James Neale, an English representative to the courts of Spain and Portugal, received a grant for 2000 acres between the Potomac and Wicomico Rivers in 1642. Charleston, an estate situated on the Wicomico River tributary that still bears its name, was home to the Jennifer family. Daniel of St. Thomas Jennifer helped frame the Constitution of the United States. His grand-nephew, Daniel Jennifer, was a member of Congress as well as United States Minister to Austria.²³ Places of worship, including Christ Church on Chaptico Bay and Newport Church on Newport Run, were also established in the Wicomico River watershed during the 17th century.²⁴

Agriculture and fishing developed as the primary economic base in St. Mary's and Charles Counties, although ship building and the fur trade were also important industries. Sailing ships, usually displacing from 300-1200 tons, were built of wood from the abundant forest



Section of Herrman's map *Virginia and Maryland, 1693*, showing "Wichocomoco R."
 "Zachkia Swamp" and location of English plantations' foundations along the shore. From Papenfuss/Coale: *The Hammond-Harwood House Atlas of Historical Maps of Maryland 1608-1908*, Figs. 14a & b, Pp. 14-15.



Section of John Hinton's *A New Map of the Province of Maryland in North America, 1780*, showing major roads bypassing St. Mary's City area. Papenfuss/Coale, Fig. 49 P. 44.



*Christ Church, Chaptico, Md.
 founded 1642*

land. During the late 17th century, a mill was established by John Allen near the confluence of the Zekiah Swamp and Wicomico River. Tobacco, the principal crop, became legal tender although grains including barley, rye and oats were occasionally used as a medium of exchange.

The increased population in Southern Maryland created the need for a new political subdivision. On May 10, 1658, Governor Josias Fendall issued a proclamation establishing Charles County. The first Charles County Courthouse was constructed near the lower portion of Zekiah Swamp Run.

Transportation in the region improved on June 4, 1658 when a ferry run was started over the Wicomico River.²⁵ Because most goods were transported by water, ports of entry were established to ensure the proper collection of duties. Llewellynburg, which is today known as Bushwood, was designated an official Port of Entry by the Maryland Assembly in 1669.²⁶ The local road network was also gradually improved. In 1695, postal service opened between Southern Maryland and Philadelphia starting from Newton's Point on the Wicomico River.²⁷

During the last half of the 17th century, the Puritan settlement of Providence along the Severn River expanded considerably and the town of Annapolis became an important seaport. In 1695, the capital of the Maryland colony was moved to Annapolis. This action resulted in the virtual abandonment of St. Mary's City by 1705. With the political and cultural center of the region gone, agriculture and fishing grew in importance and remained the economic

foundation for Southern Maryland through the early 18th century. A supply of cheap labor was necessary to harvest the tobacco crop. Initially, planters had relied primarily on convicts and indentured servants. However, by the early 1700's slaves dominated the labor force on Maryland's lower western shore.

American Revolution and the War of 1812

The people of Charles and St. Mary's Counties were generally in favor of colonial freedom from Britain by 1776. Some citizens, however, did remain loyal to the Crown. Thomas Stone, a native of Charles County was not one of them. He represented Maryland at the Continental Congress and signed the Declaration of Independence. Many area residents served in the American Army during the Revolutionary War. Although Southern Maryland was not the scene of any major battles, numerous towns along the shoreline were attacked and plundered by units under Lord Dunmore, the Royal Governor of Virginia.

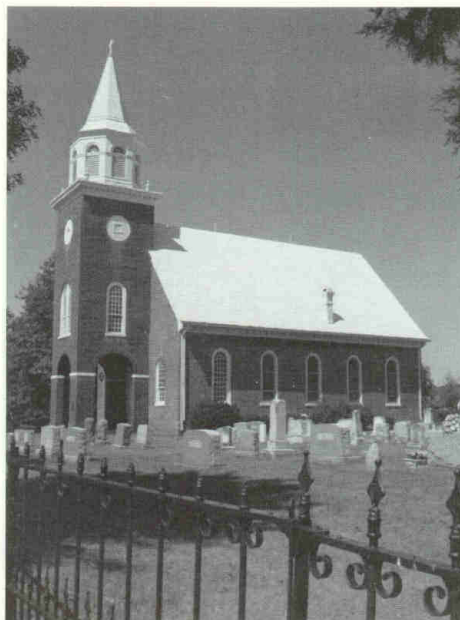


The War of 1812 brought extensive action and heavy damage to Southern Maryland. The British Navy controlled the lower Potomac River and Chesapeake Bay. On July 30, 1814, the British sailed up the Wicomico River and into Chaptico Bay. They broke windows, looted, filled the Chaptico town well, ransacked Chaptico Church and destroyed burial vaults located in the church cemetery. One of the vaults contained the remains of Francis Scott Key's ancestors. At approximately this time, Key was a prisoner aboard a British warship in Baltimore Harbor composing the Star Spangled Banner.

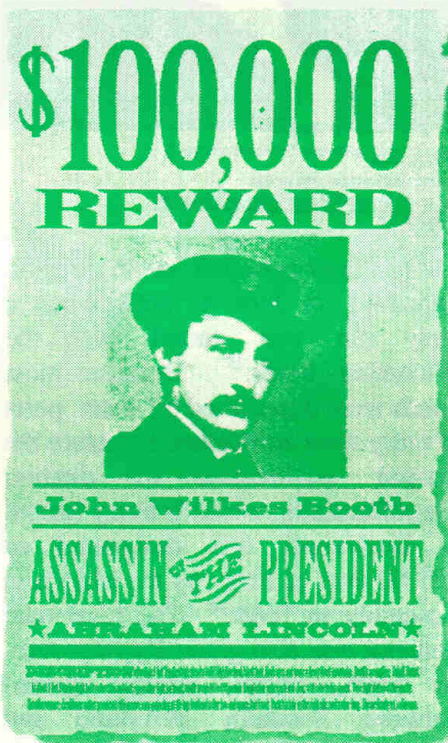
The Civil War and Lincoln Assassination

The decade preceding the Civil War was a difficult time for the people of Southern Maryland. Tobacco farming remained a major economic activity during the first half of the 19th century and emotional ties to the land developed. The use of slave labor for harvesting the tobacco crop continued to be an economic necessity. Strong feelings against a powerful central government and for local self-determination also existed. Most voters in Charles and St. Mary's Counties opposed Abraham Lincoln in the Presidential election of 1860.

During the Civil War, a strong southern sympathy existed. Union troops stationed in the region often treated the people of Southern Maryland as enemy civilians. In many instances, goods and property were destroyed by the Federal troops. The economy of the region suffered heavily during the war years.

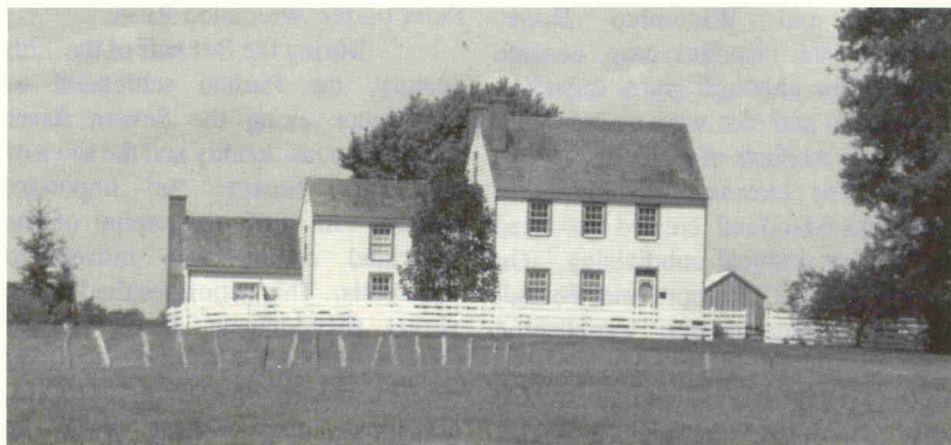


Chaptico Church today.

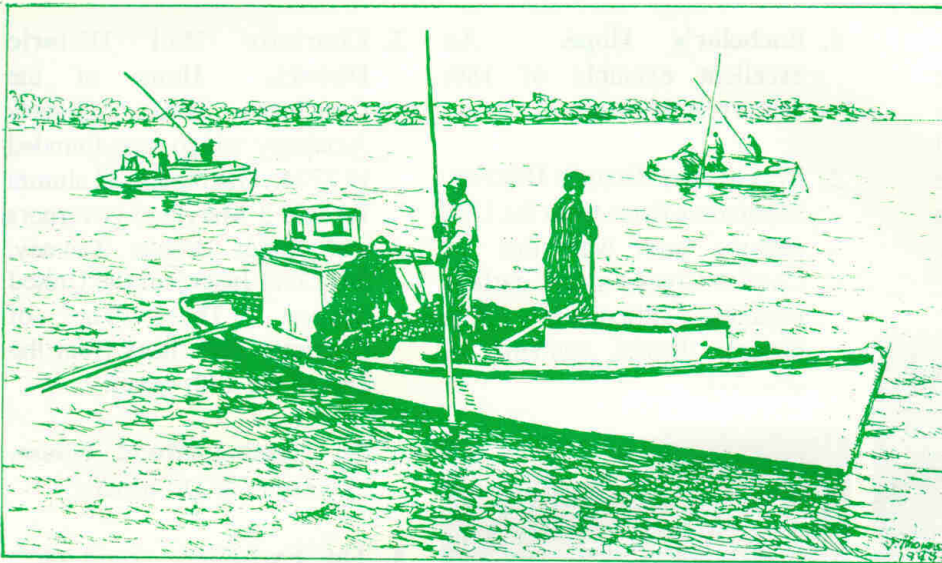


On April 14, 1865, President Lincoln was assassinated at Ford's Theater in Washington, DC. His assassin, John Wilkes Booth, suffered a broken leg in his haste to get away from the theater. Booth and his co-conspirator David Herold fled through Southern Maryland following Bryantown Road and along the northeastern edge of Zekiah Swamp. At the home of Dr. Samuel Mudd, Booth had his leg set and the next day he and Herold continued their flight through Zekiah Swamp. Eventually, they made their way across the Potomac River to Virginia.

Dr. Mudd was imprisoned for assisting Booth, but was pardoned after four years. His house, near Gallant Green, is now listed on the National Park Service's National Register of Historic Places.



The Dr. Samuel Mudd House off Bryantown Road, Charles County.



Oyster harvesting with hand tongs, Wicomico River, St. Mary's County.

Southern Maryland suffered from many of the same economic problems as the deep south immediately following the Civil War. Waldorf and La Plata began to develop commercially when they were added to the railway lines during the 1870's. However, the region remained largely rural, with agriculture and fishing continuing to dominate the economy.

Oyster harvesting had been an important commercial fishing activity in the Wicomico River since the 18th century. By the early 19th century, watermen from New England began to seek the oysters in the Chesapeake Bay and its tributaries. Local oysters were harvested with hand tongs in a random pattern. This method could

not supply the quantities demanded by the northern market and soon gave way to dredging. In order to prevent complete depletion of the oyster beds, both Maryland and Virginia enacted "no dredge" legislation in 1820. During the Civil War, little harvesting took place and the oyster population expanded. After the war, dredging was again permitted. During the period from 1870-1880, Maryland waters yielded 15,000,000 bushels of oysters. By 1880, the oyster industry was at its peak in Maryland and Virginia waters. From 1880 to 1930, the largest oyster business on the Potomac was operated at Lancaster Wharf at the mouth of the Wicomico River. 1000 gallons of shucked oysters a week were shipped from this

location during the season for approximately 25 years.²⁸

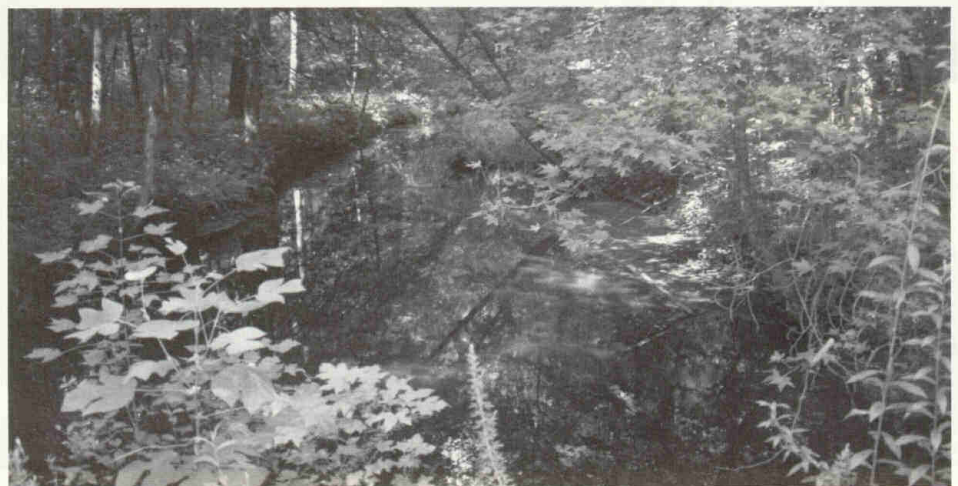
The early 20th century saw the development of a small resort industry along the Wicomico River. Steamboat stops included Bushwood, Chaptico and Lancaster Wharfs. Hotels and summer cottages sprang up to accommodate those escaping the summer heat of the city. As recently as the 1950's, famous citizens including Wisconsin Senator Joseph McCarthy and President Dwight Eisenhower enjoyed the quiet waters of the Wicomico River. The local tourist industry declined however, as the Atlantic Ocean resorts and an efficient transportation network connecting them to Baltimore and Washington, D.C. were developed.

The completion of the Potomac River Bridge in the 1930's and the Patuxent Naval Air Station and Test Center during World War II brought an increase in development and light industry to Charles and St. Mary's Counties. Recent expansion of the Washington, D.C. Metropolitan Area has also attracted service oriented businesses to Southern Maryland. Although today both counties retain a considerable amount of rural land use patterns and characteristics, growth pressure is an important issue that the region must contend with as the 21st century approaches.

ARCHAEOLOGICAL AND HISTORIC SITES

ARCHAEOLOGICAL SITES

Archaeological resources throughout the state are threatened by the increasing demands for land and water resources. Numerous archaeological sites are known to exist within the Wicomico River watershed. Experts also believe that the potential is great for additional discoveries both on land and underwater. The Maryland Historical Trust has identified the Zekiah Swamp and its adjacent land as an area that is extremely rich in archaeological resources.



Zekiah Swamp in Cedarville State Forest.

HISTORIC SITES

There are currently twelve historic sites in the Wicomico River region that are listed on the National Register of Historic Places. Each site is listed along with a brief description of its significance. (See Map: Historic Districts and Sites.)



Bryantown Tavern, 1820.



Bryantown Storehouse, 1820.



"White House" 1803, Charlotte Hall.



Sarum Manor, Charles County.

1. **Bachelor's Hope.** An excellent example of 18th century architecture.
2. **Bryantown Historic District.** Bryantown dates from the 18th century and was one of Charles County's four earliest principle settlements. The historic district contains 18 structures.

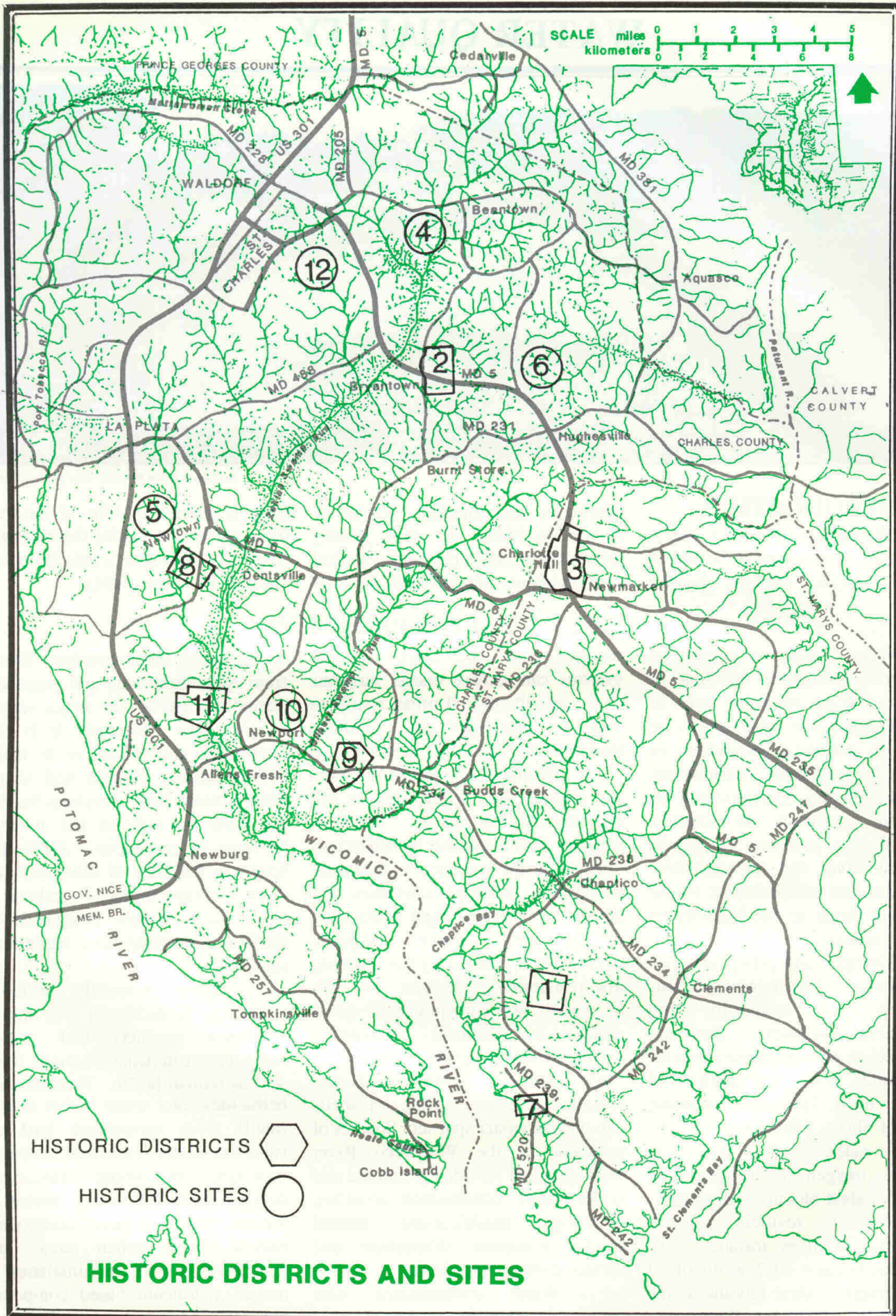


1803 Chapel, Charlotte Hall.



Dwelling in old Bryantown

3. **Charlotte Hall Historic District.** Home of the Charlotte Hall Military Academy which was founded in 1774. Distinguished alumni include 3 Maryland governors and Roger Brooke Tawney, 5th Chief Justice of the United States. The village of Charlotte Hall dates from the end of the 17th century.
4. **Dr. Samuel Mudd House.** The home of Dr. Mudd.
5. **The Exchange.** Built circa 1778. Least altered example of moderate economic strata architecture from that period.
6. **Oakland.** One of the best examples of rural Federal architecture in Southern Maryland. Built in 1823.
7. **Ocean Hall.** Home built circa 1670.
8. **Rich Hill.** The home of Colonel Samuel Cox. Booth and Herold hid on the property before escaping to Virginia.
9. **Sarum.** One of the few recognized and recorded 17th century houses in Maryland.
10. **St. Mary's Roman Catholic Church.** Built in 1840, this church is the second oldest Catholic Church building in Charles County. It is also the only public use building dating before the Civil War to retain the original interior woodwork.
11. **Timber Neck Farm.** The house is an excellent example of transitional architecture between the 18th and 19th centuries. Built circa 1780.
12. **Widow's Pleasure.** Farm dating from the 19th century.



WATER QUALITY



Headwaters of the Wicomico River at Allen's Fresh.

INTRODUCTION

The quality of surface waters can impact the biological health of finfish, shellfish, wildlife, aquatic

vegetation and riparian vegetation. Human activities are also greatly influenced when the physical, chemical and biological integrity of a water

body is degraded. One of the main purposes for designating the Wicomico River as a Maryland Scenic River is to enhance its water quality.

WATER QUALITY PROBLEMS

Water pollution occurs in many forms throughout the State of Maryland. Some problems exist in most drainage basins while others are specific to particular watersheds or locations. Nutrient enrichment, sedimentation and contamination by pathogenic organisms are common water pollution problems facing the Wicomico River and its watershed. Toxic substance contamination is also a potential threat to the integrity of this river system.

Nitrogen and phosphorus are nutrients required by living organisms to carry out metabolic and reproductive processes. However, large concentrations of these elements in a water body are detrimental because they facilitate excessive growth of algae. Elevated pH levels, reduced water clarity and low dissolved oxygen levels generally result from algal blooms. All of these factors stress resident aquatic organisms. In many instances, fish kills occur because of low dissolved oxygen levels. Algal blooms at the mouth of the Wicomico River were

reported from 1985-1987.²⁹ River systems can receive excess nutrients from agricultural and urban runoff as well as discharges from sewage treatment and industrial facilities.

Sedimentation is the movement and deposition of solids such as soil and minerals in water. Sediment particles have a number of deleterious effects on the aquatic environment. Suspended sediment decreases the amount and depth of light penetration in the water column. Aquatic vegetation is stressed by the resulting low availability of sunlight. The gills of finfish are susceptible to being clogged by sediment. Excessive sedimentation is capable of burying an entire oyster bar. In lesser quantities, sediment particles settling on shells can prevent oyster spat set. Sources of sediment in the Wicomico River drainage basin include agricultural and urban runoff, construction activities, hydrologic modifications, natural erosion processes, silviculture and surface mining operations.

Water contaminated with pathogenic organisms can pose a

serious public health problem. Runoff from agricultural land and improperly treated sewage are the major sources of pathogens. Because it is time consuming and expensive to isolate disease-causing bacteria and viruses from a water body, coliform bacteria are used to indicate the potential presence of pathogens. All surface waters in the State of Maryland must meet minimum density standards for coliforms. Waters designated for shellfish harvesting have the strictest standards.

Toxic materials including pesticides, herbicides, heavy metals, petroleum products and organic compounds can damage aquatic life as well as human health. Pesticides and herbicides enter water bodies through runoff from agricultural land and suburban lawns. Industrial discharges contain, in some instances, concentrations of heavy metals or various toxic organic compounds. Runoff from urban areas also contributes to the accumulation of metals, petroleum based compounds and organic toxins in water bodies.

WATER POLLUTION CONTROL

Sources of water pollution are generally divided into two categories: point and nonpoint. Point sources are those which discharge to a water body through a discrete pipe or ditch. Included as point sources are discharges from sewage treatment plants and industrial facilities. Nonpoint sources are all discharges not considered point sources.

POINT SOURCES

Control of point sources occurs through a permitting system created by the Federal Clean Water Act known as the National Pollutant Discharge Elimination System (NPDES). In Maryland, each discharge must be permitted by the Department of the Environment (MDE) in cooperation with the U.S. Environmental Protection Agency (EPA). Permit development for sewage treatment plants is carried out by MDE's Community Sewerage and Residential Sanitation Program. The Hazardous and Solid Waste Management Administration of MDE is responsible for regulating industrial discharges. There are currently 14 operations with NPDES permits in the Wicomico River drainage basin.³⁰

Developing NPDES permits is a complicated process involving technological considerations, water use classifications and water quality standards. Although great progress has been made during the past twenty years in the control of point source pollution, the total number of discharges located in heavily populated watersheds can contribute significantly to water quality problems.

NONPOINT SOURCES

Nonpoint source pollutants are generally delivered to water bodies in the runoff from storm events. In some situations, leachate from groundwater sources can also be a major contributor of nonpoint pollution. Sources of nonpoint pollution include urban and suburban areas, agricultural land, hydrologic modifications, underground storage tanks, septic fields, land



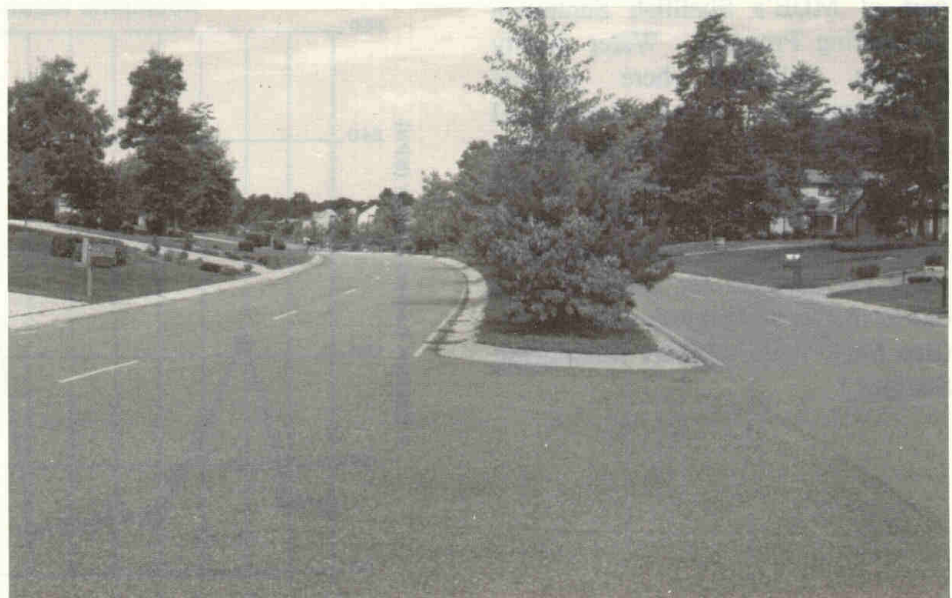
Lumbering and dairy farming in Zekiah watershed.

disposal areas, silvicultural areas and mining operations.

Control of nonpoint source pollution is centered around land use decisions. As a result, considerable research has been conducted to determine the nonpoint pollution potential of different land uses. Sediment and nutrients are more heavily concentrated in the stormwater runoff from urban areas, suburban areas and cultivated land than from forested areas. Urban and suburban areas are also more likely to contribute high levels of organic chemicals and heavy metals than other land uses.



Farm ditch near Chaptico Creek, St. Mary's County.



Impervious surfaces in suburban areas.

WATER QUALITY

The volume of stormwater runoff also varies according to land use. Regions with high levels of impervious surfaces, such as urban and suburban areas, have the potential to deliver greater quantities of runoff to waterways than do woodlands and other vegetated areas.

Controlling nonpoint sources involves both the removal of pollutants

from stormwater runoff and reduction of peak discharges from developed areas. A reduction in the volume of overland runoff may occur if infiltration occurs; however, some areas are not conducive to subsurface percolation. In such a case, stormwater can only be temporally stored, then released over an extended period of time to facilitate the

lowering of the peak discharge. Numerous programs are currently in place to address various nonpoint pollution sources. (See Appendix G.) Because land use decisions have such a major impact on the control of nonpoint source pollution, they will be discussed in greater detail.

WATER QUALITY MONITORING AND SURFACE WATER CONDITIONS

The State of Maryland monitors selected water quality parameters at a number of stations in the Wicomico River watershed. The Maryland Department of the Environment samples temperature, pH, conductivity, dissolved oxygen as well as determining the number and diversity of benthic macroinvertebrates at two Non-tidal Benthic Macroinvertebrate stations. Benthic samples and water quality measurements are collected from these stations every two years during the summer. The diversity and type of benthic organisms identified from these samples provide an assessment of overall water quality conditions.

Nineteen stations in the tidal Wicomico River are sampled monthly for temperature, salinity, dissolved oxygen and fecal coliform bacteria as part of MDE's Shellfish Sanitation Monitoring Program. Water quality samples collected here provide information about bacterial contamination of shellfish harvesting areas. (See Figures 1 and 2.) At one shellfish monitoring station tissue samples are collected once every three years for analysis for contamination due to metals and organic compounds. (See Map: Water Quality Monitoring Stations.)

Figure 1 - Bacteriological Data

Median for period 1/87 - 4/90

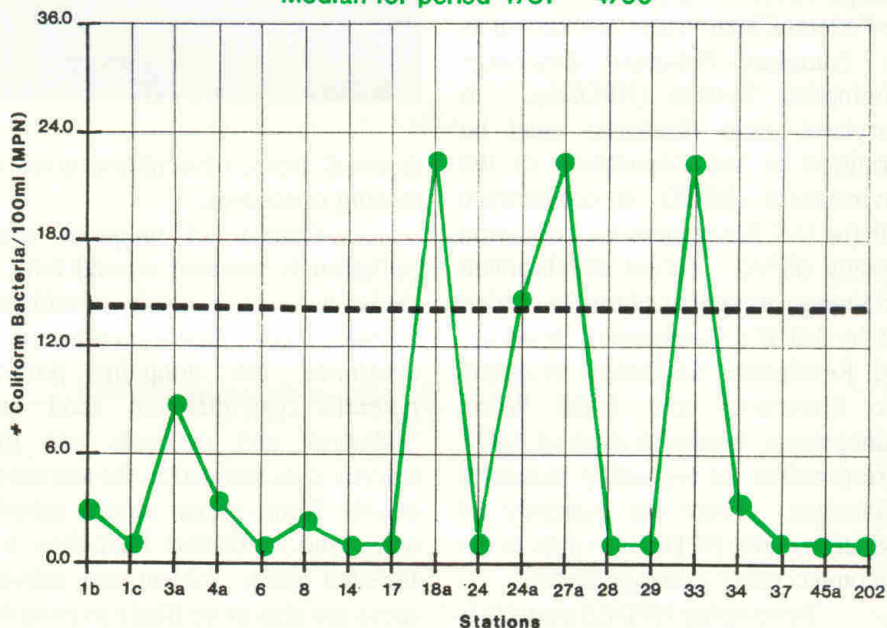
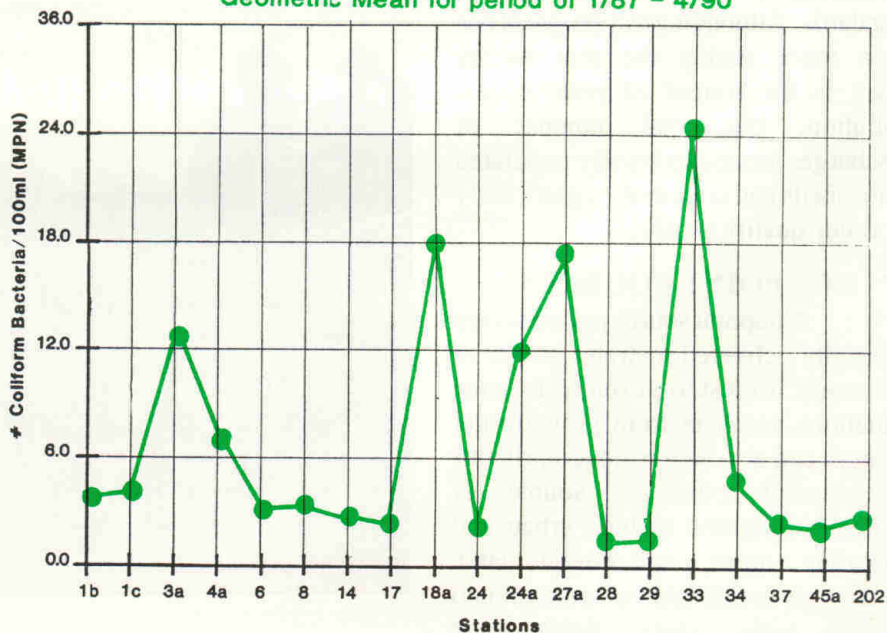
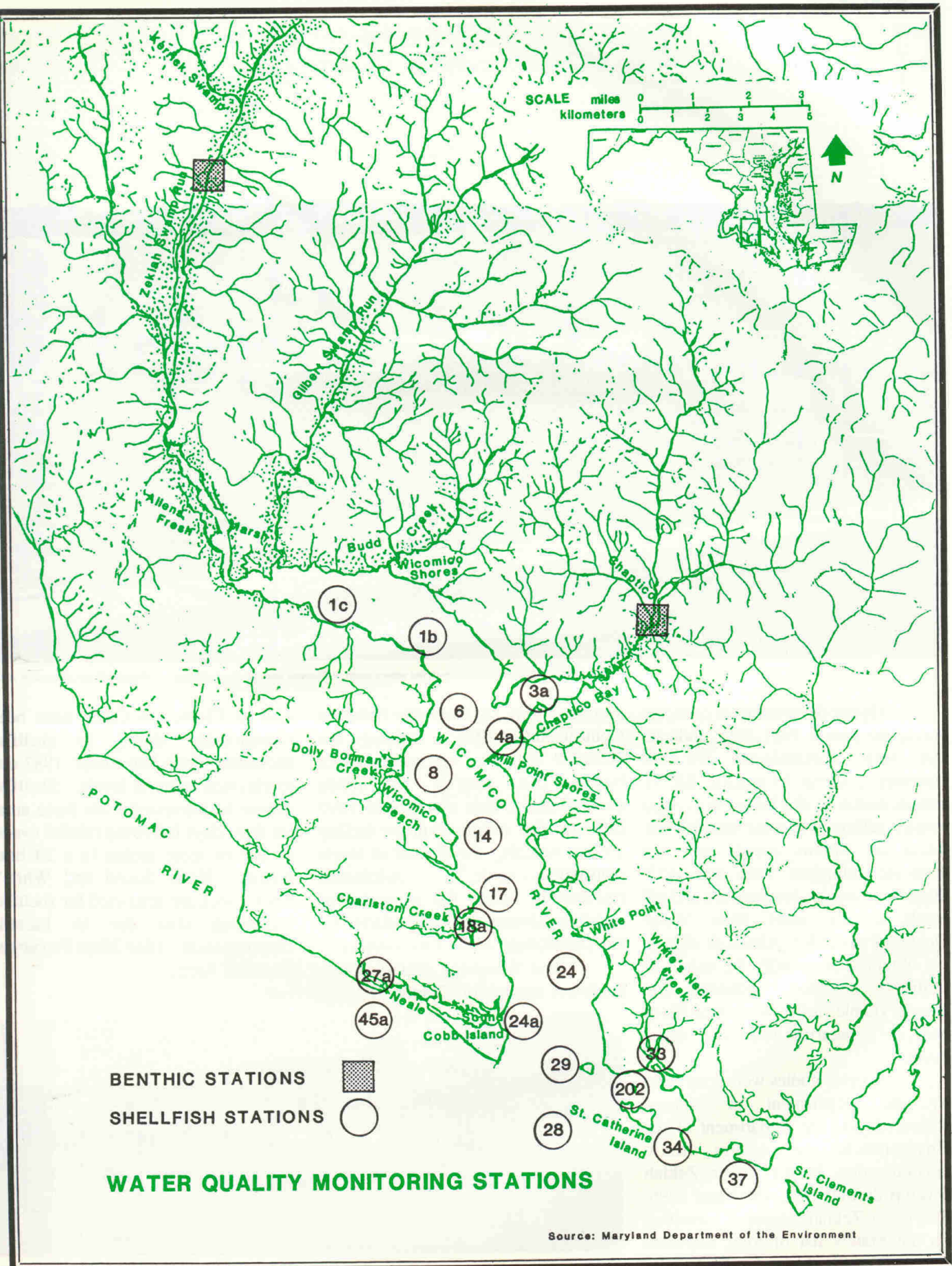


Figure 2 - Bacteriological Data

Geometric Mean for period of 1/87 - 4/90







View of the Wicomico's unrestricted waters south of Chaptico Bay, St. Mary's County. (Chaptico Wharf Recreation Area)

Oyster tissue samples collected during the period 1981-1985 indicate that toxic contaminants are not currently a threat to aquatic life or human health in the lower Wicomico estuary, although in some samples low levels of various metals and the pesticide chlordane were detected.³¹ Dissolved oxygen, temperature and pH levels usually meet State Water Quality Standards. Although data is not obtained to quantify the extent of sediment pollution, sediments are clearly visible in the Wicomico River and its tributaries following storm events.

Special studies were conducted by the Department of Natural Resources and the Department of the Environment to assess toxic contamination in the lower Zekiah Swamp during 1988, 1989 and 1990. The lower Zekiah Swamp is identified on the State's list of toxic impaired segments that is reported to EPA under

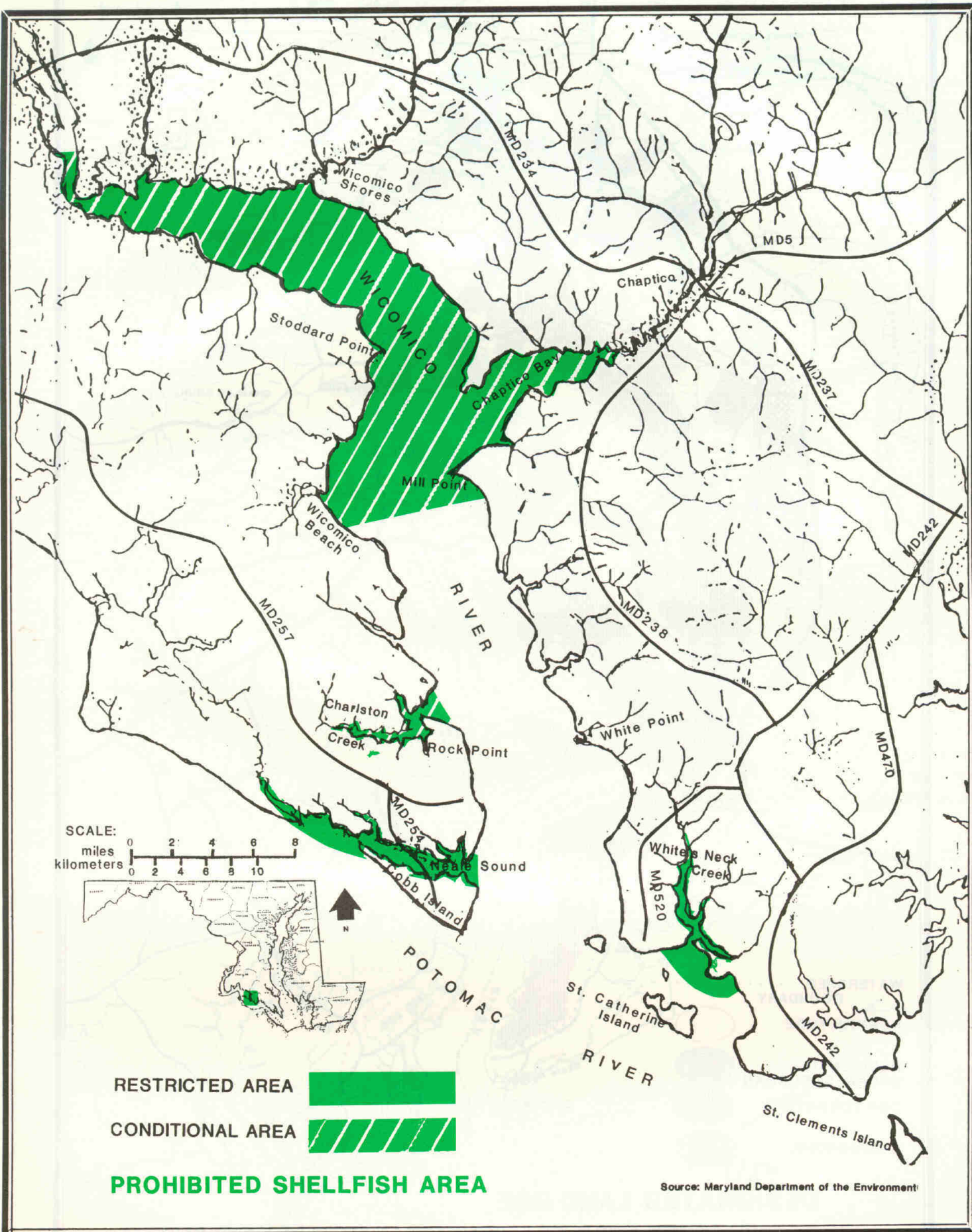
section (304)(L) of the Water Pollution Control Act of 1987. Although the Faulkner Ash Site was suspected of being the source of toxic contamination, data obtained in 1990 indicates that metals from the facility are not reaching the Zekiah at levels considered toxic.³² Additional research to locate the source(s) of metal impairment will be conducted by the Department of the Environment.

The Wicomico estuary above the lower reaches of Chaptico Bay as

well as Charleston Creek have been conditionally closed to shellfish harvesting since November, 1987 due to elevated bacteria levels. Shellfish cannot be harvested from these areas for three days following rainfall events of one or more inches in a 24 hour period. Neale Sound and White's Neck Creek are restricted for shellfish harvesting also due to bacteria contamination. (See Map: Prohibited Shellfish Area.)



Neale Sound: a restricted shellfish harvesting area.



ERRATA SHEET

On Page 47, delete the following sentence from Land Use and Resource Protection Planning section: "*Building density in the Resource Protection District is set at one unit per twenty acres.*"

LAND USE AND WATER RESOURCES PLANNING

INTRODUCTION

Accommodating an expanding population and the resulting demand for land and water resources while minimizing adverse impacts on Maryland's natural resources has become a priority for local and state government. Charles County and St. Mary's County have recently revised their comprehensive plans to address anticipated future community growth

and economic development as well as resource protection issues. Both counties have also developed solid waste management and water and sewerage plans to provide for the availability of these essential services.

The pattern of future land use and the management of water resources will have a major impact on the Wicomico River and its tributaries.

Therefore, a review of existing land and water resource planning in the Wicomico drainage basin is an important component of this river study. Future coordination of local and state efforts should increase the efficiency and effectiveness of growth management planning. (See Maps: Designated Land Uses and Public Lands.)

CHARLES COUNTY COMPREHENSIVE PLAN

Charles County is bordered by Prince George's County, St. Mary's County, and the Patuxent, Potomac and Wicomico Rivers. The county is predominantly rural with 55,000 acres of urban land out of a total acreage of 289,011.³³ Recent and rapid population growth in the county has placed increased demands on the area's natural resources including the resources of the Zekiah Swamp, Wicomico River and their tributaries.

4,352 acres were converted from rural to urban land in Charles County during the period 1978-1985.³⁴ Between 1980 and 1988, the population of Charles County increased from 72,751 to 96,941.³⁵ The pressures exerted by this growth in population and changing land uses caused the county to revise the 1974 Comprehensive Plan.

The Charles County Comprehensive Plan adopted in 1990 is intended to guide development in

the county through the year 2010. The plan addresses transportation, schools, land use, water and sewer service, agriculture and natural resources. The general objective of the Comprehensive Plan is to "maintain a pace of growth and development which is managed and moderate in order to preserve to the greatest extent possible the present character of the County and enhance the quality of life for its citizens".³⁶

LAND USE AND RESOURCE PROTECTION PLANNING

A variety of zoning techniques are available to help protect water bodies from degradation and conserve other natural resources. Some of the most effective include channeling development into areas that can easily accept it, clustering development so that the total amount of lost vegetative cover and increased impervious surface area is reduced, and imposing tighter development restrictions in riparian areas. All of these methods are utilized in the new Charles County Zoning Ordinance.

The County's philosophy in terms of land use is that new development should be of a controlled nature and channeled into the most appropriate areas and discouraged in other areas. Fourteen general areas or Planning Districts have been established. These categories provide the framework for the classification of land into specific districts for zoning

purposes. The Land Use Concept Plan directs additional growth to the northwestern portion of the County, specifically areas in and adjacent to the Mattawoman Sewer Service Area, and the Town of La Plata. The Zekiah Swamp watershed contains portions of both La Plata and the Mattawoman Sewer Service Area. However, the majority of the Wicomico River drainage basin in Charles County is located in the Rural Conservation and Resource Protection Districts.³⁷

The Resource Protection District outlined in the county's zoning ordinance, an outgrowth of the Stream Valley Management and Protection Program, imposes more strict development standards along stream corridors than exist in the other zoning districts. This is especially important because forested riparian buffers are very effective at reducing the amount of nonpoint pollutants discharged to

water bodies. They also provide critical habitat to a wide range of wildlife species. The Charles County Resource Protection District includes intermittent and perennial streams, their 100-year floodplains and an adjacent buffer. The buffer is 100 feet for a third order stream and 50 feet for first and second order streams. If non-tidal wetlands are adjacent to the stream, the buffer extends from the landward side of the wetland. When steep slopes greater than 15% abut a stream, the buffer distance is doubled. Building density in the Resource Protection District is set at one unit per twenty acres. Timber harvesting and agriculture are permitted provided that the operation has the appropriate sediment and erosion control, soil and water quality and forest management plans.

WATER AND SEWER SERVICE

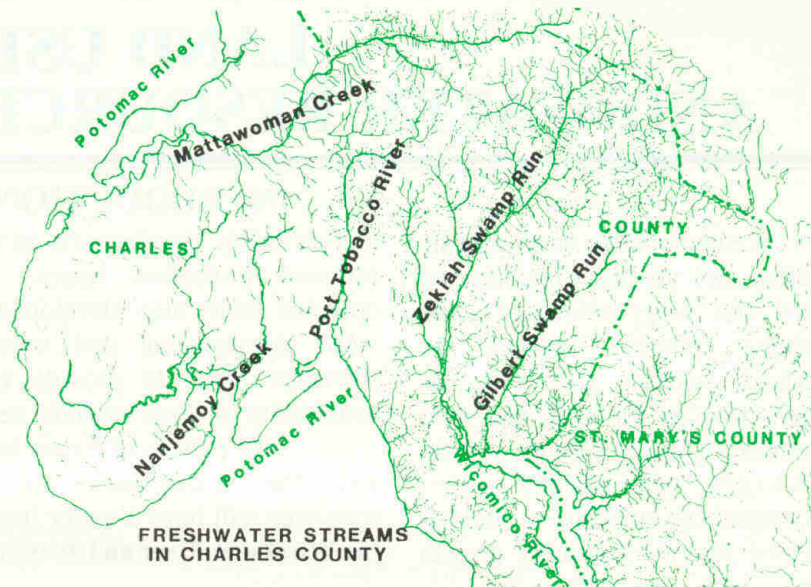
Water Service is provided to Charles County residents by individual wells and community water supply systems. The County currently derives all of its potable water from groundwater sources. Water demand projections indicate that, at least for the Development Districts, additional water sources may be required. Charles County contains all or major portions of the drainage basins of five fresh water streams: Mattawoman and Nanjemoy Creeks, Zekiah and Gilbert Swamp Runs and the Port Tobacco River. The low flow and sometimes intermittent nature of these streams and associated tributaries, however, constrains their development for public water supply.³⁸ This situation, combined with the salinity constraints of the estuary, means that the building of dams for water supply purposes is not a major issue in the Wicomico River watershed. Charles County has, however, identified Kerrick Run as a potential impoundment site, although development of a reservoir is not considered economically feasible at this time. Further study will be necessary before any future construction occurs. Improving yield from groundwater sources and connecting with the Washington Suburban Sanitary Commission System are two alternatives that Charles County is likely to consider in order to accommodate future water needs.³⁹

Sewage treatment service in Charles County is provided by one large central system, two municipal sewer systems, several smaller community systems, and private septic systems. The Town of La Plata Municipal Waste Water Treatment Plant and six smaller community facilities have approved NPDES permits in the Charles County portion of the Wicomico River drainage basin.⁴⁰ Most of the watershed is serviced by private septic systems.

The provision of sewerage and sewage disposal facilities is a powerful growth management tool. Land with soils that are unable to accommodate

septic systems cannot be developed without sewer lines. In Charles County, a considerable portion of the land is poorly drained and therefore unsuitable for septic disposal fields. The Commissioners of Charles County have stated that they would like 75% of all new growth to occur in the area serviced by the Mattawoman Sewage

Treatment Plant. By controlling the provision of sewer hook-ups in other regions, Charles County will effectively channel growth into this area. A portion of the Wicomico River drainage basin is located in the Mattawoman service area and is therefore likely to experience future development pressure.



ST. MARY'S COUNTY COMPREHENSIVE PLAN

St. Mary's County is also a predominantly rural jurisdiction with 52,800 acres of urban land out of a total acreage of 238,425.⁴¹ The County is bordered by the Chesapeake Bay, the Patuxent, Potomac, and Wicomico Rivers and Charles County. During the late 1970's and early 1980's, St. Mary's County grew at a slower rate than Charles County with only an 800 acre increase in total urban land between 1978 and 1985.⁴² However, recent projections have indicated that by the year 2000 the population of St. Mary's County will have increased by 17,000 over the 1988 level of 75,000.⁴³

As a result of the projected population increase, St. Mary's County revised its 1974 Comprehensive Plan in 1988. The current plan is designed to address both immediate and long range (20 - 30 year) planning considerations for land use, transportation, community facilities and utilities. Objectives of the St. Mary's County Comprehensive Plan include:

- Protection of farmland resources as components of both an important local industry and rural character.
- Protection of sensitive natural characteristics or environmental features.
- Protection and enhancement of the visual qualities and characteristics of existing settlements in the county.
- Directing and managing the distribution of future land uses anticipated with a growth in population.
- Guiding of public investment in services, facilities and improvements in a manner which is timely, cost effective and easily maintained.

LAND USE AND RESOURCE PROTECTION PLANNING

The land use concept for St. Mary's County is comprised of seven planning areas. Most of the expected increase in growth will be directed toward the Development Districts which surround Leonardtown and Lexington Park. Designated secondary growth areas are the Town Centers and Village Centers. Town Centers are the communities of Charlotte Hall, New Market, Mechanicsville, Hollywood and Piney Point. The Village Centers in St. Mary's County include Bushwood, Callaway, Chaptico, Clements, Loveville, St. Inigoes, Ridge and Valley Lee. Although the Wicomico River drainage basin contains some areas targeted for secondary growth, the vast majority of the watershed in St. Mary's County is located in the Rural Preservation District. Building density in the Rural Preservation District is set at one unit per three acres.⁴⁴

St. Mary's County has policies for the protection of natural resources. Policies are focused on mineral resources, forests and woodlands, water features such as wetlands and floodplains, steep lands, soils and habitat resources. The resource protection policies also include guidelines restricting development in the 100 year floodplain, non-tidal wetlands, tidal wetlands, woodlands and stream buffers. Development is discouraged on steep slopes of 15-25% and prohibited on those over 25%.

Section 38.03 of the County zoning ordinance requires that when a lot or parcel of record contains a floodplain, a water quality protection zone and a water quality protection buffer must be delineated. Both the protection zone and the buffer are measured from the edge of the 100 year floodplain and any adjacent slopes greater than 20% with highly erodible soils or non-tidal wetlands. The water quality protection zone is a "no disturbance" buffer of 25 feet. The water quality protection buffer is an additional zone of 150 feet in which impervious surfaces are limited



Chaptico cemetery and farm meadow in the lowlands near Nelson Run.

to 10%. These requirements have "in lieu of" standards which require implementation of stormwater management and a 50-foot vegetated buffer. The purpose of these requirements is to protect streams by establishing a vegetated buffer and controlling post development runoff.

Under 49.00 of the St. Mary's County zoning ordinance 90-11, resource protection standards are established county wide. These standards require the identification of the following resources: 100 year floodplains, tidal wetlands, nontidal wetlands, 50 foot stream buffer, woodlands, slopes over 25% and slopes 15-25%. These first four items must be protected from disturbance.

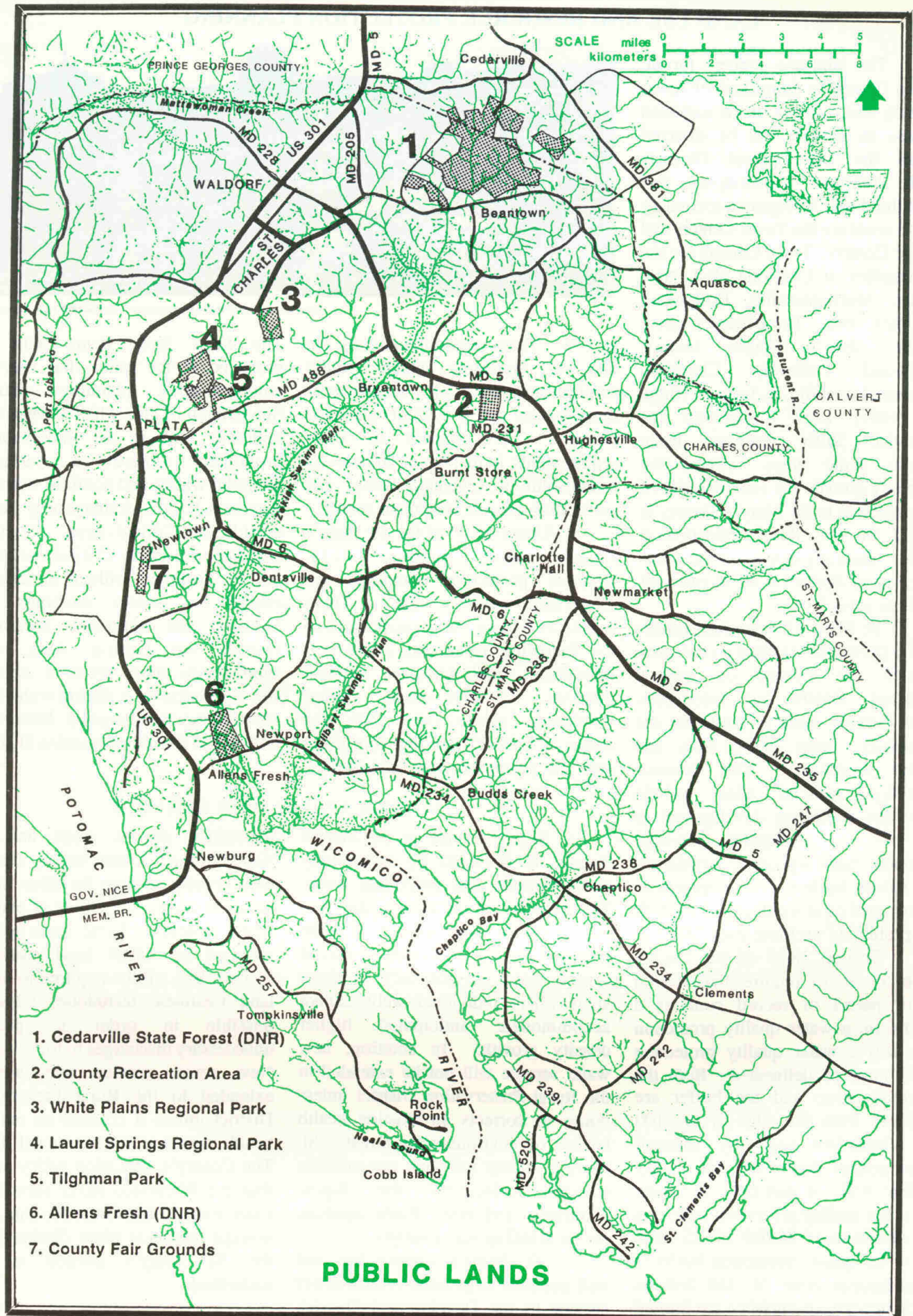
The latter three items must be protected at the ratios that vary by comprehensive planning district. Subdivision of land which creates new buildable land in the floodplain is prohibited without a variance. Nontidal waters and nontidal wetlands receive a 50 foot drainage way buffer outside the Critical Area. Nontidal wetlands outside the Critical Area may not be disturbed without a variance except for stream crossings and sediment and stormwater measures. Outside the Critical Area, new subdivisions must preserve existing site vegetation on a sliding scale from 30% in the Development District to 60% in the Rural Preservation District.

WATER AND SEWER SERVICE

Water service in St. Mary's County is provided by community water systems and individual wells. The majority of the county does not receive public water service. It is the policy of St. Mary's County to extend central water service only to those areas where individual wells cannot accommodate anticipated higher density growth. In addition, new water service will not be extended to the Rural Preservation District unless doing so corrects an existing health hazard or environmental threat. St. Mary's County relies on groundwater sources, principally the Aquia, Nanjemoy and Piney Point aquifers, for its drinking water supply.

St. Mary's County has and will continue to provide central sewer service to the Development District.

Secondary growth areas and the Neighborhood Conservation District may require sewage facilities in the future to correct the failure of existing septic systems. These areas will be serviced by small local treatment systems that will be required to utilize land treatment techniques wherever possible in order to prevent unnecessary discharges to local waters. New sewer service will not be extended to the Rural Preservation District unless it corrects an existing health hazard or environmental threat. The County's allocation policy means that the Wicomico River should not receive significant future pressure from sewage treatment plant discharges in the St. Mary's portion of the watershed.



CHESAPEAKE BAY CRITICAL AREA PROGRAM

In 1984, the Maryland General Assembly passed the Chesapeake Bay Critical Area Act to guide activities along the shoreline of the Bay and its tidal tributaries. The Critical Area is defined as "a strip of land along the tidal shoreline extending 1,000 feet landward from the water's edge, or from the landward boundary of any adjacent tidal wetland". The Critical Area Act (Natural Resources Article Section 8-1801 through 8-1816) establishes the Chesapeake Bay Critical Area Commission and mandates that local jurisdictions with land in the Critical Area develop and implement a management program to protect the Chesapeake Bay and its tidal tributaries. Local programs must adhere to guidelines or "criteria" established by the Commission. Both St. Mary's and Charles Counties are implementing programs that have been approved by the Chesapeake Bay Critical Area Commission.

LAND USE IN THE CRITICAL AREA

Land use within the Critical Area is divided into three categories. Intense Development Areas are regions of at least twenty adjacent acres where residential, commercial, institutional and/or industrial development predominate and where relatively little natural habitat occurs. Limited Development Areas are those regions which are currently developed in low or moderate intensity uses. Portions of these areas contain natural plant and animal habitats, and the quality of runoff has not been substantially altered or impaired. Resource Conservation Areas are those regions dominated by wetlands, forests, abandoned fields, agriculture, forestry, fisheries activities or aquaculture.

The intention of the Chesapeake Bay Critical Area Act is to accommodate limited growth within the Critical Area and to assure that where development does occur, it will be planned to minimize adverse environmental impacts. To help

accomplish this objective, future development in the Critical Area is directed toward Intense Development Areas and Limited Development Areas. Land within Resource Conservation Areas can be developed for residential uses, but at a density not to exceed one unit per twenty acres. To provide for the designation of additional Intense Development and Limited Development Areas, each local jurisdiction is granted a growth allocation. The growth allocation is equal to 5% of the jurisdiction's Resource Conservation Area remaining once tidal wetland acreage and federally owned land is subtracted.

Charles County has 30,424 acres of land within the Chesapeake Bay Critical Area. 27,949 acres or 91.9% are classified as Resource Conservation Areas. Limited Development Areas account for 2,206 acres with the remaining 269 acres being classified as Intense Development Areas. Charles County is eligible to convert a total of 1130 acres to higher density development.⁴⁵

The St. Mary's County portion of the Critical Area contains 42,994 acres. This total includes 33,717 acres of Resource Conservation Area, 7,910 acres of Limited Development Area, and 1,371 acres of Intense Development Area. The growth allocation for St. Mary's County is 1,686 acres.⁴⁶

The vast majority of the Critical Area adjacent to the Wicomico River is designated as Resource Conservation Area. Cobb Island and Wicomico Beach in Charles County and Longview Beach, Millpoint Shores and Wicomico Shores in St. Mary's County are, however, Limited Development Areas. Future development in the Wicomico River portion of the Chesapeake Bay Critical Area will be guided by the growth allocation policies contained in the Charles and St. Mary's County Critical Area plans. In general, the existing subdivisions will be allowed to build

out to maximum density for Limited Development Areas, while the remaining land in the Critical Area will remain Resource Conservation Area.

RESOURCE PROTECTION PLANNING

Numerous natural resource protection issues are addressed by the Critical Area Criteria in addition to land use. These include water dependent facilities, forest and woodland protection, agriculture, surface mining, natural areas and parks, and habitat protection.⁴⁷ The Criteria also mandate the establishment of a vegetative riparian buffer extending 100 feet landward of the Mean High Water Line of tidal waters, tributary streams and tidal wetlands. New development activities are not permitted within the buffer unless they are water dependent. Agricultural and timber harvesting operations also have to meet certain conditions before they are allowed.

St. Mary's County and Charles County have instituted programs to manage these natural resources as elements of their Critical Area plans. Each county has also established an environmental review process to ensure that future development in the Critical Area complies with the resource protection requirements of the Chesapeake Bay Critical Area Criteria.

Following the land use and resource protection strategies outlined in each county's Comprehensive and Chesapeake Bay Critical Area Plans will greatly contribute toward preserving many of the natural and scenic qualities of the Wicomico River. A number of additional issues, however, must be addressed if the goals of the management plan are to be realized.

ISSUES AND RECOMMENDATIONS



Looking south toward the confluence of the Wicomico and Potomac Rivers from Chaptico Wharf Recreation Area, St. Mary's County.

INTRODUCTION

Previous sections of this document have discussed the resources associated with the Wicomico River and Zekiah Swamp. The following section identifies the issues that must be resolved to reach the goals outlined in the Background and Introduction chapter. Throughout the development of this management plan, the Wicomico River Local Advisory Board and other citizens who attended the public Board meetings have been instrumental in identifying the issues affecting the river system and local community.

This section also contains specific recommendations designed to address the identified issues and to provide for the wise use and management of the resources of the Wicomico River watershed. These

recommendations have been developed by the Wicomico River Local Advisory Board and are directed to the citizens of Charles and St. Mary's Counties as well as local and state government. There is often a close relationship between issues that involve land use, water quality, fish and wildlife resources, economics and public health. Developing management strategies and recommendations to resolve such issues requires balancing the needs of many diverse groups. The Wicomico River Local Advisory Board carefully considered the study information, public input and presentations by guest speakers who are experts in many professional disciplines in formulating the recommendations put forward in this document.

LAND USE PLANNING AND CONSERVATION

OVERVIEW

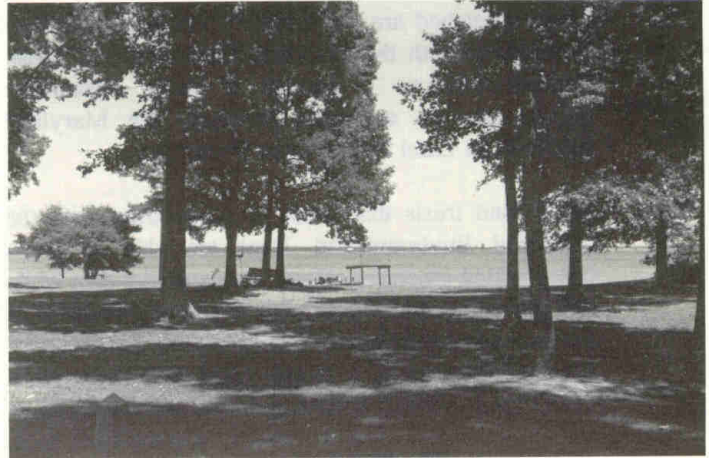
Population growth in Charles and St. Mary's Counties will place additional demands on land and water resources. Expanding urban and suburban areas have the potential to contribute more sources of point and nonpoint pollution to the Wicomico watershed.

OBJECTIVES

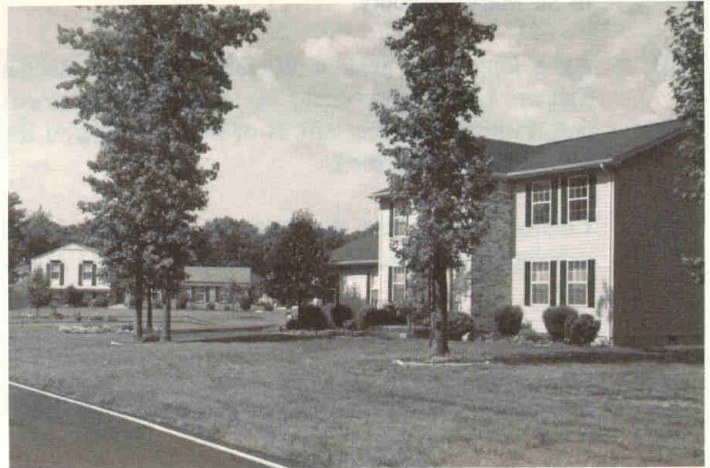
- 1) *Improve water quality by encouraging compatibility between active land uses and the natural environment.*
- 2) *Help protect important natural areas by the use of appropriate land conservation techniques.*
- 3) *Provide additional open space and opportunities for outdoor recreation in order to improve the quality of life for local citizens.*

RECOMMENDATIONS

- 1) The building densities specified in the Charles and St. Mary's County zoning ordinances, including the Critical Area portions, should be maintained and enforced. This is especially important in sensitive and rural areas.
- 2) Charles and St. Mary's Counties should consider the Scenic River designation of the Wicomico River when determining if a project is to be awarded growth allocation in the Chesapeake Bay Critical Area.
- 3) St. Mary's and Charles Counties should prohibit the conversion of any Resource Conservation or Limited Development Areas to Intensely Developed Area in the Wicomico River portion of the Chesapeake Bay Critical Area.
- 4) Structures located in and adjacent to floodplains can pose a safety threat, fragment aquatic and terrestrial habitat as well as contribute to nonpoint source pollution. Both counties need to enforce the floodplain management requirements contained in their zoning ordinances.
- 5) St. Mary's County should consider establishing a low density zoning district along stream valley corridors. The Charles County Resource Protection District can provide a working model.
- 6) Both counties should explore development incentives which could lessen adverse impacts on the Wicomico River and Zekiah Swamp. Possible options could include transferable development rights (TDR's) or a property tax credit to developers who incorporate setback distances beyond county requirements.



Open space and opportunities for outdoor recreation are provided on Cobb Island overlooking the Wicomico River.



"Designing clustered subdivisions can increase open space and protect sensitive areas." Pinewood, off St. Peter's Church Road, Charles Co.

- 7) Designing clustered subdivisions can reduce total land consumption, increase open space and protect sensitive areas while allowing developers to build the maximum number of units permitted on a particular tract of land. Charles and St. Mary's Counties should strongly encourage cluster development, especially in rural areas. This can be accomplished by offering incentives to developments which promote clustering. Additional credits should be considered for projects that cluster and retain open space as a buffer to the Zekiah Swamp.
- 8) The Maryland Environmental Trust (MET) exists to help preserve farmland, forestland, waterfront, rare or unique natural areas, scenic areas, endangered species habitat, historic properties and other rural land. Conservation easements are the most common mechanism used by the Maryland Environmental Trust to accomplish these goals. A conservation easement is a voluntary legal agreement between a property owner and the Trust limiting the uses and changes that can be made on a particular parcel of land. Property owners who donate conservation easements retain ownership of the land while receiving substantial income, estate and property tax credits. Landowners in the Wicomico

Land Use Planning and Conservation Recommendations

River watershed are encouraged to explore easement possibilities with the Maryland Environmental Trust. Recommendations 1 through 4 under Agriculture discuss another easement program, the Maryland Agricultural Land Preservation Foundation.

- 9) Local land trusts that work in cooperation with the Maryland Environmental Trust are able to focus conservation easement efforts in a particular area while still providing landowners with all the opportunities of a conservation easement. Charles County has proposed the establishment of a county-wide land trust and is encouraged to target resources to the Wicomico River watershed. MET is also working to establish a local land trust in St. Mary's County. Land trust efforts should also be focused toward the Wicomico watershed in St. Mary's County.
- 10) As a long term goal, a Wicomico River - Zekiah Swamp Land Trust could be established to focus conservation easement efforts of both counties in the Scenic River watershed.
- 11) Charles County and the State of Maryland should develop a joint strategy for acquiring land along Allens

Fresh and the Zekiah Swamp for protection, public education and low impact recreation purposes. Priority consideration should be given to purchasing land adjacent to the Zekiah Swamp Natural Environment Area. The timing for acquiring specific parcels will depend upon the availability of funds and willing sellers.

- 12) The Maryland Department of Natural Resources Greenways/Resources Planning section will develop a Master Plan for the Zekiah Swamp Natural Environment Area and any additional land that is acquired along the Zekiah Swamp. This Master Plan will be the result of a cumulative process which uses a site analysis to determine sensitivities and appropriate facility and management options. Local government and citizen involvement will be an integral part of the Master Plan development process.
- 13) Facility development within the Zekiah Swamp Natural Environment Area shall be minimal. Any development will be directed toward the goals of environmental education and providing limited opportunities for low impact recreational activities such as fishing, hiking, horseback riding, canoeing and nature interpretation.

PROJECT REVIEW AND CONTROL OF URBAN NONPOINT SOURCE POLLUTION

OVERVIEW

Nonpoint source pollution associated with development and urbanization is likely to increase as the population in the Wicomico River watershed expands.



Mill Dam Run receiving stormwater from Bryantown Road crossing. It joins Zekiah Swamp Run.

OBJECTIVES

- 1) *Improve water quality by enforcing existing local and state stormwater management and sediment control laws.*
- 2) *Encourage the utilization of federal and state cost share funding programs for shoreline erosion control and stormwater quality management in the Wicomico River watershed.*
- 3) *Facilitate additional cooperation between local, state and federal permitting agencies in the review of proposed projects.*

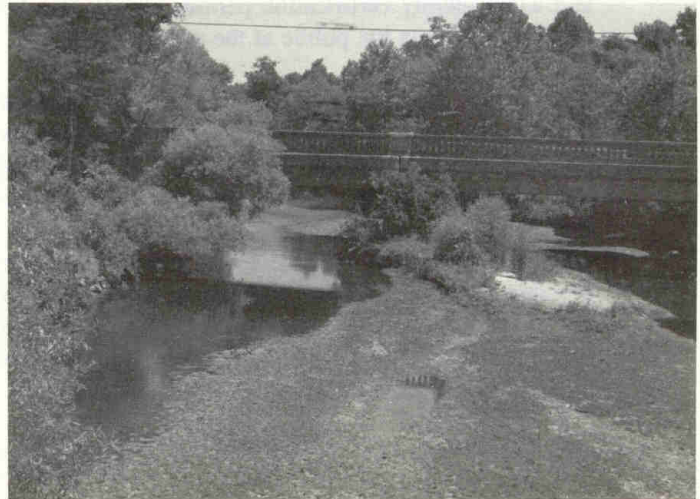
RECOMMENDATIONS

- 1) Government agencies should continue to work actively with project sponsors to design structures in a manner that will reduce adverse habitat and water quality impacts. The Scenic River designation of the Wicomico River - Zekiah Swamp system needs to be considered when environmental permits are issued.
- 2) Non-tidal wetland permits including avoidance, minimization and mitigation requirements must be vigorously enforced. This is especially important in the Zekiah Swamp, which has been designated as a

Project Review and Control of Urban Nonpoint Source Pollution Recommendations

non-tidal wetland of special state concern as well as a component of the Scenic and Wild Rivers system.

- 3) The sensitive nature of the Wicomico River - Zekiah Swamp Scenic River system should be taken into account by the State Highway Administration in determining the degree and type of sediment control practices required on highway and bridge construction projects.
- 4) State capital projects such as highway construction should be required to involve the local Soil Conservation District in the development and approval of sediment control plans. The Districts should receive adequate funding to accomplish this task.
- 5) Local and state governments should ensure that staffing levels for sediment control and stormwater facility inspector positions are sufficient. Charles and St. Mary's Counties should have well trained, qualified inspectors.
- 6) Encourage staged development in clearing and grading practices so that the total amount of land disturbed at any one time is minimized.
- 7) Utilize natural features, when they are available, to maximize the retention of soil on development sites.
- 8) Consider basing the size of sediment traps and sediment basins on total amount of land cleared. Increase the minimum size of these sediment control devices in appropriate situations.
- 9) Development plans should be designed to conserve groundwater recharge areas which are essential for the maintenance of baseflows in headwater streams. The use of non-impervious surfaces in site designs is also strongly encouraged.
- 10) In order to reduce environmental impact, the counties should continue with long range plans to properly locate future stormwater ponds, especially if they must occur in or adjacent to environmentally sensitive stream corridors. The installation of future stormwater ponds in stream corridor areas should be avoided.
- 11) Charles and St. Mary's Counties should ensure, by ordinance or agreement, that stormwater management facilities are properly maintained.
- 12) Considerable attention has been given towards reducing the impacts of new development. However, many areas developed prior to the passage of the Maryland Stormwater Management Act do not currently have facilities to control the quality of stormwater runoff. Similar attention should also be focused on retrofit projects for improving stormwater quality in older



St. Mary's Church Road bridge over Newport Run and marsh.

development areas. Existing high density developments in the Wicomico River watershed should be examined and appropriate sites for stormwater quality retrofits identified.

- 13) Charles and St. Mary's Counties are encouraged to take advantage of the Maryland Stormwater Control Cost Share Program. This program, administered by the Sediment and Stormwater Administration of the Department of the Environment, can provide up to \$500,000 in financial assistance to local governments for the installation of stormwater management facilities in existing urban areas.
- 14) Additional research into the effectiveness of sediment and erosion control and stormwater management technologies is strongly encouraged.
- 15) St. Mary's and Charles Counties are encouraged to develop a watershed management district for the Wicomico River. Locating facilities based on the needs of the entire watershed will increase the effectiveness of stormwater management and sediment control projects.
- 16) St. Mary's County should explore the application and encourage the acceptance of grants from a variety of governmental or environmental organizations for shore erosion control on existing subdivisions such as Mill Point Shores and Wicomico Shores.
- 17) Target Non-Structural Shore Erosion Control Cost-Share funding to the Wicomico River.
- 18) The state or counties should develop an information package that explains the permit process, regulations and techniques involved in shore erosion control construction. This material needs to be made readily

Project Review and Control of Urban Nonpoint Source Pollution Recommendations

available to the public. Information regarding the process for obtaining wetland, floodplain, Critical Area and water quality certification permits should also be made available to the public at the county level.

- 19) Improperly constructed shoreline erosion control devices can pose a safety threat and contribute to nonpoint source pollution. One method of correcting this problem is to direct property owners to knowledgeable agencies for information and advice when an application is made for a permit. Another possible solution is for the counties to issue a license or permit certifying contractors for shoreline construction work. Certification could be based on past experience, knowledge and examples of past work.

Contractors could also be required to post a bond, as is required for stormwater management pond construction, to further insure that such projects will be properly designed and constructed.

- 20) Altering floodplains, waterways, tidal wetlands and nontidal wetlands requires various permits from state and federal agencies (See appendix G, Index to Selected Government Agencies and Programs). In order to relieve some of the public frustration and misconception about the permit programs, as well as decrease the time spent obtaining permits, application forms could be made available at the county planning offices. County staff should also be capable of aiding citizens in completing the permit applications.

AGRICULTURE



Farm buildings on Route 6 in the Wicomico River watershed.

OVERVIEW

Agriculture is an important part of the economic, scenic and rural character of Charles and St. Mary's Counties as well as a preferred land use. Improperly managed agricultural land can, however, contribute sediment, nutrient, pesticide and bacterial pollutants to the Wicomico River and Zekiah Swamp.

OBJECTIVES

- 1) *Encourage the preservation of agricultural land.*
- 2) *Improve water quality and conserve soil resources.*



Charles County farm.



Charles County tobacco farm.

RECOMMENDATIONS

- 1) The Maryland Agricultural Land Preservation Foundation is currently working to preserve farmland throughout the State. The Counties could encourage participation in this program by increasing or matching the amount paid by the Foundation for an easement.
- 2) Charles and St. Mary's Counties should consider establishing local programs in addition to the Maryland Agricultural Land Preservation Foundation. This will allow landowners who are interested in preserving agricultural land additional options.
- 3) Counties with a certified local program receive a greater percentage of the Maryland Agriculture Transfer Tax. St. Mary's and Charles Counties should develop a program(s) to obtain certification from the Maryland Office of Planning.
- 4) Property taxes could be reduced or waived for landowners who participate in an agricultural land preservation program.
- 5) The Maryland Department of Agriculture and the Cooperative Extension Service or successor organizations should continue to provide information and technical assistance to pesticide applicators.
- 6) State and Federal regulations regarding the manufacture, sale and application of pesticides should be vigorously enforced.
- 7) Charles and St. Mary's Counties should encourage local landowners to seek the assistance of the Cooperative Extension Service before beginning pesticide applications.
- 8) The use of new technologies for the breakdown and disposal of pesticides should be explored and encouraged.
- 9) There is a strong need to develop facilities that will accept and properly dispose of pesticides.
- 10) Target funding for Integrated Crop Management and other alternative strategies such as low input and sustainable agriculture to St. Mary's and Charles Counties.
- 11) An educational brochure promoting agricultural Best Management Practices should be produced and distributed to landowners, including absentee landowners.
- 12) The Wicomico River is ranked seventh among the state's priority watershed's for the potential release of agricultural phosphorus. Resources and funding need to be targeted to the Wicomico watershed for Soil Conservation and Water Quality Planning.
- 13) There is a significant need for technical assistance to increase implementation of Soil Conservation and Water Quality Plans. Funding through CZM grants for technical outreach positions should be pursued.
- 14) Enforcement action needs to be taken against identified agricultural polluters in the Wicomico River watershed.
- 15) Continue funding the Tri-County Council for Southern Maryland's development and implementation of a data base for tracking the quantity and location of nonpoint source pollution.
- 16) Consider providing a property tax credit to farmers who implement Soil Conservation and Water Quality plans.
- 17) Federal and State subsidy programs and regulations should be examined to determine if any of them conflict with sound soil and water conservation practices. Any programs not encouraging good conservation practices should be modified.
- 18) Tax incentives that encourage poor soil conservation practices should also be changed.

POINT SOURCE DISCHARGE CONTROL AND SOLID WASTE DISPOSAL

OVERVIEW

Future population growth in the Wicomico River region will place an increased burden on current waste disposal facilities. Proper control of point source discharges and management of waste materials are essential to the protection of public health and the other resources of the Wicomico River watershed.

Objectives

OBJECTIVES

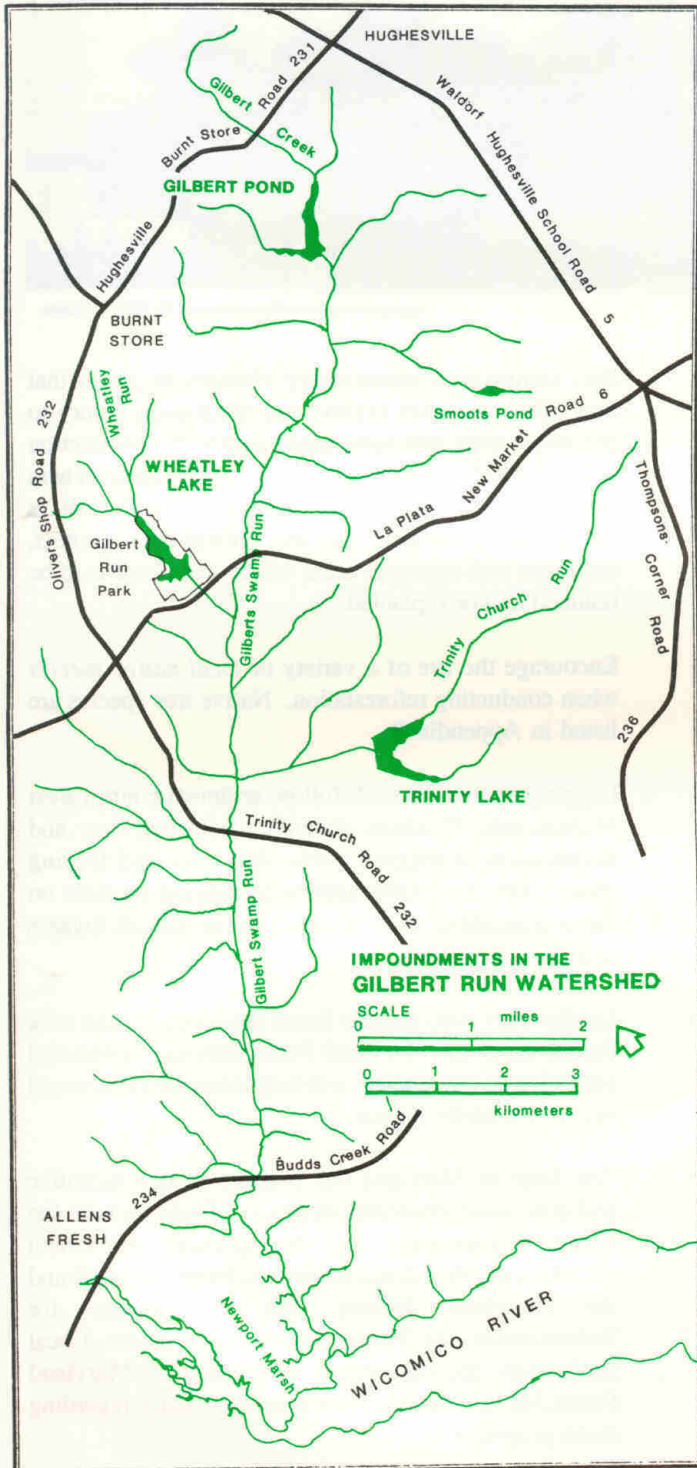
- 1) *Protect water quality by enforcing existing local, state and federal point source discharge and waste disposal laws.*
- 2) *Encourage additional solutions to the problems of waste management and disposal.*

RECOMMENDATIONS

- 1) Sewage treatment plants and industrial facilities in the Wicomico River watershed must meet all discharge permit requirements. State and federal water quality regulations must be enforced where violations and violators are identified.
- 2) Consideration should be given to developing programs for accepting, handling and properly disposing of agricultural and household toxic materials and containers. Informing the public of the availability of any such program is also necessary.
- 3) There is strong concern about adverse environmental impacts stemming from the Faulkner Ash Site. PEPCO must be required to meet all NPDES permit requirements for this facility. Compliance inspections should be conducted on a quarterly basis regardless of future ownership.
- 4) Since discharge permits are issued every five years, future NPDES permit requirements for the Faulkner Ash Site must continue to ensure that the facility does not cause a violation of state water quality standards. Ash leachate migration must be contained using the best available technology.
- 5) Charles and St. Mary's Counties need to carefully examine future special exception zoning requests that may adversely impact water quality and other resources along the Wicomico River and its tributaries. Special attention must be given to waste disposal sites and industrial processes that will require a NPDES permit. Both counties should establish a review process that will provide for a thorough environmental assessment, including recommendations from the County environmental planning staff, prior to any Board of Zoning Appeals decisions regarding such projects.
- 6) Charles and St. Mary's Counties should not grant special exception zoning requests in the Wicomico River watershed permitting industrial operations that will discharge substances listed by the U.S. Environmental Protection Agency as priority pollutants.
- 7) Waste disposal facilities are not compatible with Scenic River and Area of Critical State Concern designations. Therefore, St. Mary's and Charles Counties should require that any future solid or toxic waste disposal sites be located a minimum of 1000 feet from the Wicomico River, Zekiah Swamp and their tributaries. The hydrologic characteristics of a particular site may warrant an additional buffer to adequately protect water quality.
- 8) Future waste disposal sites must meet all federal and state design criteria. Inspections during the operating life of these facilities are necessary to ensure that only authorized materials are accepted.
- 9) To ensure that only authorized materials are accepted, any privately operated waste disposal facilities should be required to have a sanitarian on site during all operating periods. The sanitarian should be a county employee whose salary is paid by the waste disposal facility operator.
- 10) The local, state and federal governments need to continue to rigidly monitor and enforce laws that deal with sewage sludge application and storage. The Scenic River designation of the Wicomico River - Zekiah Swamp system needs to be considered when determining buffer distance requirements.
- 11) Returning and recycling waste materials to productive use can reduce disposal costs, save energy and conserve natural resources. Charles and St. Mary's Counties should continue developing and implementing comprehensive recycling programs.
- 12) Failing septic systems pose a public health threat and can contribute to nutrient enrichment problems. Areas of failing septic in the Wicomico River watershed should be identified and corrected.
- 13) Illegal dumping of tires, appliances and scrap metal is a problem in some locations along the river. The counties should pursue methods to encourage citizens to discard wastes in legally permitted landfills. One suggestion is to increase the number of transfer stations available to local residents.
- 14) There is a strong need to develop cost effective recycling technologies for solid waste items including plastics and materials defined as rubble.

Point Source Discharge Control and Solid Waste Disposal Recommendations

- 15) Charles and St. Mary's Counties need to update their Solid Waste Management Plans. Potential waste disposal sites need to be identified and ranked based on geology first and then other appropriate natural resource criteria. Identified sites should be mapped and a Public Hearing conducted to discuss issues pertaining to location, ownership and regulations for the operation of waste disposal facilities. A temporary moratorium on waste disposal site development, whether public or private, should be imposed until both counties Solid Waste Management Plans are updated.



GILBERT RUN WATERSHED

OVERVIEW

Gilbert Run, a major tributary of the Wicomico River, was altered during the 1960's to retard flooding under provisions of the federal Watershed Protection and Flood Prevention Act. Three dams were constructed and nine miles of stream channelized in the watershed. The Gilbert Run Public Watershed Association is responsible under Maryland law for the continuing maintenance of the project. Concerns have been raised about possible adverse impacts on the Wicomico River due to the changed hydrology of Gilbert Run. These include increased sediment and pesticide loading, changes in salinity concentration due to high fresh water flows during storm events and destruction of finfish habitat.

OBJECTIVES

- 1) *Encourage federal, state and local government agencies to participate in a full environmental impact study of the Gilbert Run project.*
- 2) *Improve the water quality and biological health of the Wicomico River by implementing the recommendations resulting from such a study.*

RECOMMENDATIONS

- 1) The Gilbert Run Public Watershed Association has requested that the U.S. Environmental Protection Agency undertake an impact study of the Gilbert Run project. It is strongly recommended that the Commissioners of Charles and St. Mary's Counties, the Charles and St. Mary's Soil Conservation Districts, the Maryland Departments of Agriculture, Environment and Natural Resources and the Maryland General Assembly support this request.
- 2) The study should determine the extent of adverse environmental impacts resulting from the Gilbert Run Watershed project. It should also address methods that can be employed to reduce such impacts while maintaining the flood control benefits and possible water supply and recreational uses of the watershed.



Gilbert Swamp Run under Rte 6 bridge.

FOREST COVER AND TIMBER MANAGEMENT



Farm wooded area along Rte 238, St. Mary's County.



Clearing on Rock Point Road near Wicomico River, Charles County.

OVERVIEW

Forests and woodland areas contribute significantly to the control of nonpoint source pollutants and provide habitat for many wildlife species. The sale of timber is also a source of revenue for the economies of Charles and St. Mary's Counties. For these reasons, it is important to develop a forest management strategy which will promote conservation as growth pressures increase.

OBJECTIVES

- 1) *Help maintain the productivity and biological health of the Wicomico River - Zekiah Swamp system.*
- 2) *Identify and facilitate appropriate uses and protection of significant forested areas located in the watershed.*
- 3) *Encourage reforestation in riparian zones.*



Logging trucks near Mechanicsville, St. Mary's County.

RECOMMENDATIONS

- 1) Charles and St. Mary's Counties need to ensure that the requirements contained in the Forest and Woodland Protection and Buffer Management sections of their Chesapeake Bay Critical Area Plans are vigorously enforced.
- 2) Both counties should minimize and/or prohibit vegetative disturbance in stream valley corridors for a specified distance from the edge of each stream. This distance can best be determined by each county and should be included in the zoning ordinance.
- 3) Loss of forest cover in stream valley corridors may be mitigated in-kind by requiring replacement of forest land on-site. If on-site mitigation is not possible, replacement forest cover can be located on other properties within the Zekiah-Wicomico watershed. It is also important that mitigation requirements be strictly enforced.
- 4) Due to limited resources and funding, state and local governments need to identify and establish priority critical stream corridor areas in need of reforestation. Areas containing steep slopes and highly erodible soils should be given top priority.
- 5) Soil compaction, unnecessary changes in grade that may affect moisture regime and mechanical injury to pre-trunk areas and roots associated with construction will reduce the chances of vegetative survival. Where development is planned in "sensitive areas" such as stream valley corridors and the Critical Area, protect, designate and segregate areas where tree cover is to be retained and/or replanted.
- 6) Encourage the use of a variety of *local native species* when conducting reforestation. Native tree species are listed in Appendix B.
- 7) Logging operations shall follow sediment control Best Management Practices regarding location, use and stabilization of logging roads, skid trails and loading areas. This especially applies to logging projects on lands adjacent to the Wicomico River, Zekiah Swamp and their tributaries.
- 8) Landowners who initiate forest activities should seek the advice of the Maryland Forest Service. Additional education of landowners will help decrease erosion and improve wildlife habitat.
- 9) The State of Maryland has forestry related incentive and cost share programs in place. These include the Forest Conservation and Management Agreement (FCMA), the Woodland Incentives Program (WIP) and the Maryland Income Tax Modification for Reforestation and Timber Stand Improvement. Local landowners are encouraged to contact the Maryland Forest Service for information and assistance regarding these programs.

FINFISH, SHELLFISH, WILDLIFE AND ENDANGERED SPECIES MANAGEMENT

OVERVIEW

The Wicomico River and its tributaries provide vital habitat for many finfish and wildlife species. The river is also one of the most productive oyster grounds in the State of Maryland. Numerous rare species also depend on the varied habitats located in the watershed. For these reasons, it is important to develop a strategy that will promote the conservation of these valuable resources.

OBJECTIVES

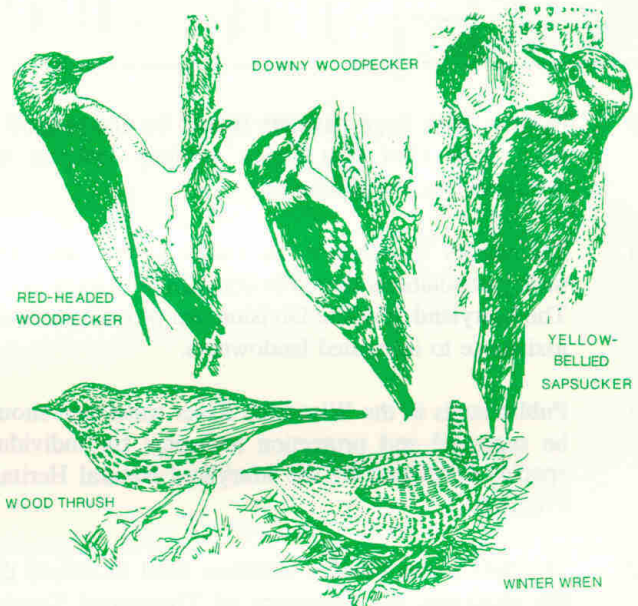
- 1) *Help maintain the biological health and diversity of the river system.*
- 2) *Encourage additional citizen and agency cooperation with respect to the management of species important to recreation and commerce.*

RECOMMENDATIONS

- 1) Charles and St. Mary's Counties have delineated strategies for the protection of Anadromous Fish Propagation Waters in their Chesapeake Bay Critical Area Plans. Both counties need to ensure that the strategies are followed. These requirements should also be extended upstream beyond the limits of the Critical Area where anadromous finfish spawning activities have been documented by the Tidewater Administration of the Maryland Department of Natural Resources.
- 2) The floodplain swamp regions are the key to the productivity of the Wicomico River system from an anadromous fisheries perspective. Existing Critical Area, zoning and wetland requirements must be vigorously enforced to insure minimal future impact to these sensitive areas.
- 3) Gilbert Run was a major anadromous fish spawning area prior to its channelization. Restoration of the Gilbert Run spawning grounds would greatly enhance the finfish productivity of the Wicomico River system.
- 4) Introduction of seed and shell from selected areas has been instrumental in the restoration of the Wicomico River's oyster industry. Both counties should endorse the Department of Natural Resources Shellfish Repletion Program.
- 5) Low water levels in the upper Wicomico estuary are a major navigation problem for vessels that haul shell. Local watermen who own smaller boats should be encouraged to move fresh oyster shell to the upper seven oyster bar sites.
- 6) Manual labor for projects such as shellbag making and reef construction is a small, but vital need. One untapped labor source is convicted offenders sentenced to community service. Local conservation groups are also encouraged to help in these efforts.
- 7) During the past several years, the seven upper oyster bars have been naturally reproducing. Limiting impacts from sediment and bacterial pollution is especially important in this region. Hydraulic clam dredging is not allowed in Charles County and should also be prohibited in St. Mary's County. Farm animals

should be prohibited from wandering along shoreline and stream beds. Their presence in adjacent buffer areas should also be restricted.

- 8) Additional scientific research pertaining to oyster aquaculture and diseases is strongly encouraged. Aquaculture has the potential to improve oyster harvests and promote conservation of the resource.
- 9) Wildlife management in the Wicomico River watershed should consider game and nongame species with the aim of perpetuating the indigenous ecological community.
- 10) The strategies for Plant and Wildlife Habitat Protection outlined in the Charles and St. Mary's County Chesapeake Bay Critical Area Plans should be implemented. Every attempt should be made to conserve the remaining large forest tracts in the Critical Area which qualify as Forest Interior Dwelling Bird habitat.



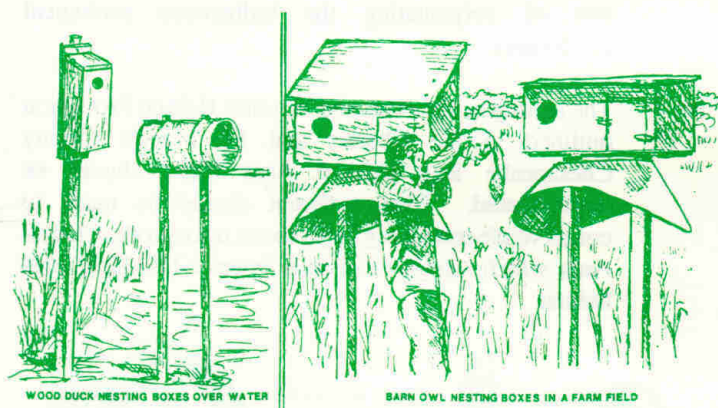
SOME FOREST INTERIOR DWELLING BIRDS

- 11) Encourage private landowners to manage their land so that local wildlife habitat can be enhanced. This includes preservation of den areas, tree cavities, nesting areas and ground cover.

- 12) Consider installing wood duck nests in the river corridor in observed wood duck nesting areas. The Maryland Wildlife Service is available to provide technical assistance to interested landowners.
- 13) Population monitoring/surveys should be given high priority as integral components of an overall program for wildlife management. Information on the status of existing wildlife populations and their reaction to any management efforts or activities should be collected. Surveys should be conducted on private lands only with landowner permission.
- 14) Hunting, trapping and other activities that may affect wildlife populations need to balance the continuing well being of individual species and the entire ecological environment in the Wicomico River region. Deer hunting should be encouraged in the area to effectively manage the population and reduce crop damage. Hunters need to respect the desires of local landowners and obtain permission before entering private property.



Cedarville State Forest in the headwaters of Zekiah Swamp Run, is exceptional habitat for forest interior dwelling species.



- 15) Farmers with large pastures should be encouraged to erect Barn Owl nest boxes to help increase the Wicomico area's population.
- 16) Techniques to enhance the ruffed grouse and wild turkey populations should be considered in forest areas. The Maryland Wildlife Division can provide technical assistance to interested landowners.
- 17) Public lands in the Wicomico River watershed should be surveyed and protection measures for individual species developed by the Maryland Natural Heritage Program.
- 18) St. Mary's and Charles Counties need to ensure that the strategies for protection of Threatened Species, Endangered Species and Species in Need of Conservation contained in their respective Chesapeake Bay Critical Area Plans are followed.
- 19) Establish habitat and population monitoring programs. Continue survey efforts to discover additional
- 20) New rare species populations that are found on private lands should be added to the Maryland Natural Areas Registry. If those lands become available for sale, consider proposing land acquisition by nonprofit organizations. Soliciting landowners for voluntary conservation easements is another viable protection mechanism.
- 21) Owners of land containing habitat or range of rare, threatened or endangered species should be encouraged to incorporate habitat preservation when considering management options for their property.
- 22) Active bald eagle nesting sites in the Wicomico River watershed should be protected according to established guidelines. Any new nesting sites, whether in Charles or St. Mary's County, should also receive the same level of protection.

BOATING ISSUES



Boats in Neale Sound, near the mouth of the Wicomico River.

OVERVIEW

The Wicomico River estuary is an important recreational resource for the citizens of Charles and St. Mary's Counties. However, certain recreational activities can have an impact on the natural resources of the river.

OBJECTIVES

- 1) *Help encourage safe boating use of the Wicomico River.*
- 2) *Enhance water quality by decreasing the discharge of pollutants from vessels.*



Small marina in Neale Sound.

RECOMMENDATIONS

- 1) The Boating Administration of the Maryland Department of Natural Resources is encouraged to study and establish any necessary boat speed limits and restricted boating areas in the Wicomico River.
- 2) The Maryland Department of Natural Resources should consider increasing the number of police officers available to patrol the Wicomico River.
- 3) Existing regulations pertaining to boat noise levels and the discharge of untreated sewage need to be enforced.
- 4) Informing the boating community of the potential impacts of vessel waste disposal is vital. Educational materials could be distributed along with boat registration notifications.
- 5) All marinas with 10 or more slips should be encouraged to install pumpout facilities regardless of future expansion plans.
- 6) Consideration should be given to having the Wicomico River declared a "No Discharge Zone".
- 7) Establish a neighborhood river watch group to report boating violations.
- 8) The Coast Guard should increase the number of markers in the Wicomico River to help prevent possible accidents as boat traffic increases.
- 9) Public access along the Wicomico River estuary is limited. St. Mary's County should preserve the access points at the Chaptico wharf and Bushwood wharf recreation areas. Charles County should consider developing a site if a suitable location and a willing seller can be found.
- 10) The development of future marina facilities should be conducted in compliance with the criteria in the Section 401 Water Quality Certification Marina Assessment Guidelines developed and implemented by the Maryland Department of the Environment. Disturbances to existing submerged aquatic vegetation beds should be avoided during marina construction.

WATER QUALITY MONITORING

OVERVIEW

Proper decisions regarding pollution control strategies are dependent on adequate water quality information.

OBJECTIVE

- 1) *Improve water quality by helping to more accurately identify pollutant sources in the Wicomico River watershed.*

RECOMMENDATIONS

- 1) Water quality data for a large portion of the Wicomico River watershed is inadequate to accurately assess the impact of changes in land use and point source discharges. The state and county governments and volunteer organizations should form a task group to develop a work plan for addressing the water quality monitoring needs of the watershed.
- 2) Charles County has recently proposed the initiation of county-wide stream water quality monitoring. This program is strongly supported. St. Mary's County should also establish a stream water quality monitoring program.
- 3) The State should continue to monitor and maintain existing water sampling stations in the Wicomico River watershed.
- 4) High levels of fecal coliform bacteria have caused some portions of the Wicomico River to be conditionally closed or restricted for shellfish harvesting. The Charles and St. Mary's County Health Departments should participate in developing and implementing a work plan to determine the sources of bacterial contamination.
- 5) Resources and funding for state and local government monitoring efforts are limited. Therefore, developing a citizen volunteer water sampling program should be considered. Including student volunteers would give local schools the opportunity to teach science in an active and interesting manner.
- 6) The monitoring programs of volunteer organizations and local and state government departments need to be coordinated in the future to prevent duplicating efforts.
- 7) A standardized data base with a central location in St. Mary's or Charles County and a coordinator should be developed for the Wicomico River watershed. The Chesapeake Bay Trust could be approached to fund such a project. Monitoring data may be of interest outside the watershed and should also be stored in an easily accessible computer such as the EPA STORET system.



Waterlilies in Cedarville Pond.

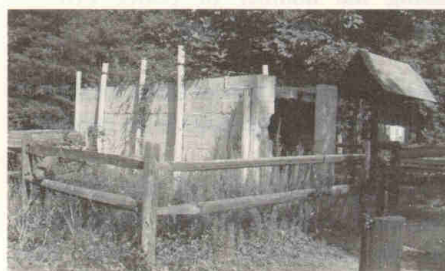
HISTORIC AND CULTURAL RESOURCES

OVERVIEW

The Maryland Historical Trust has identified the Wicomico River and Zekiah Swamp as an outstanding archaeological resource. The watershed also contains many historically significant structures that are part of the heritage of Charles and St. Mary's Counties. These valuable cultural resources should be protected.

OBJECTIVE

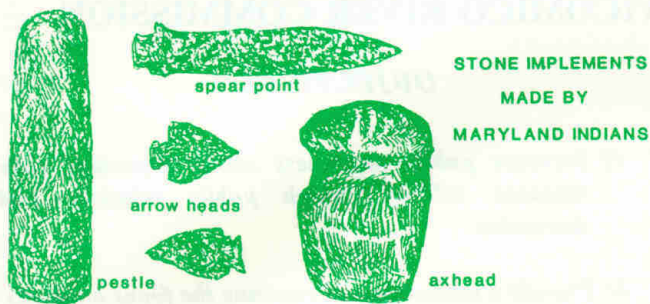
- 1) *Identify and encourage appropriate protective measures for significant archaeological and cultural resources.*



Old charcoal kiln
in Cedarville
State Forest,
Charles County.

RECOMMENDATIONS

- 1) It is recommended that Charles and St. Mary's Counties coordinate preservation planning with the Maryland Historical Trust. The review of development proposals which may impact historic and archaeological sites is especially important early in the planning process.



- 2) The Maryland Historical Trust should continue to actively approach Charles and St. Mary's County property owners whose lands contain significant archaeological or historic sites for voluntary historic preservation easements. Efforts should be coordinated with local historical societies.

- 3) Private groups dedicated to historic preservation, local governments and state government should consider purchasing in fee, acquiring easements or officially designating significant archaeological and historic sites for the purposes of preservation and education when property owners are agreeable.
- 4) County and state sponsored studies are needed to locate and identify archaeological resources contained in the Zekiah Swamp.
- 5) Support archaeological research and encourage developers to allow archaeologists a limited time to excavate their land before development begins.
- 6) Provide tax incentives to encourage restoration and preservation of historic structures by private owners.

PUBLIC EDUCATION

OVERVIEW

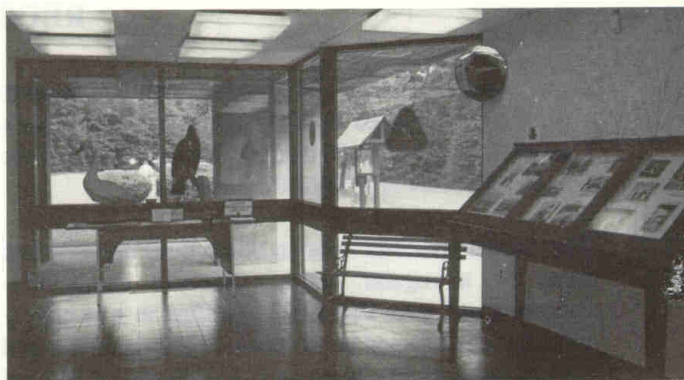
People who live near or visit the Wicomico River and Zekiah Swamp impact the resource as well as other users. Without the knowledgeable cooperation of divergent user groups and individuals, the goals of this plan cannot be realized. The recommendations proposed for public education are intended to provide an opportunity for everyone interested in the Wicomico River, Zekiah Swamp and their adjacent lands to understand and participate in the management effort.

OBJECTIVE

- 1) *Increase public awareness about the important natural and cultural resources associated with the Wicomico River and Zekiah Swamp.*

RECOMMENDATIONS

- 1) A brochure should be developed that explains the importance of the Wicomico River and Zekiah Swamp. This literature should be made readily available to the public at local libraries and the Zekiah Swamp Natural Environment Area. Applicants for permits and licenses to conduct activities that may impact the Wicomico River or Zekiah Swamp should also receive the publication. An excellent example of such a brochure is The Zekiah...A Resource to be Protected, which was published by Charles County with funding from the Maryland Coastal Zone Management Program.
- 2) The Zekiah Swamp Natural Environment Area can and should serve as a public education and information center for the Wicomico River and Zekiah Swamp.
- 3) The Department of Natural Resources and Charles County should request that the Maryland State Highway Administration post new signs on bridge crossings that recognize the Wicomico River and Zekiah Swamp as components of the Scenic and Wild Rivers system.



The Cedarville State Park office has displays which increase public awareness about the resources of the Wicomico River and Zekiah Swamp.

- 4) The Wicomico River Study and Management Plan should be made available to the public in the reference sections of local libraries.
- 5) The proposed Wicomico River Commission should have a published telephone number that the general public can use to request information about river related issues.
- 6) The state should develop a list of speakers who are knowledgeable about the resources of the Wicomico River watershed. Civic groups, schools and business organizations could draw on such a list for speakers on a variety of topics.
- 7) A scrapbook of articles from the local newspapers should be developed to highlight the issues affecting the Wicomico River and Zekiah Swamp.
- 8) Local schools are encouraged to "adopt" sections of the Wicomico River and Zekiah Swamp. Students can gain knowledge of natural systems by monitoring water quality and learning to identify the plant and animal species associated with the different habitats found in the watershed.

FORMATION OF A PERMANENT WICOMICO RIVER COMMISSION

OVERVIEW

Implementation of the Wicomico River Study and Management Plan will depend on local support and citizen involvement.



OBJECTIVES

- 1) *Increase public awareness about important river resource values through public relations and discussion.*
- 2) *Provide a mechanism to continue the focus on issues impacting the Wicomico River and Zekiah Swamp and possible solutions.*
- 3) *Provide a public forum for citizen input and identification of new issues facing the Wicomico River watershed and their possible solutions.*

RECOMMENDATIONS

- 1) A permanent bi-county Wicomico River Commission should be established by the Charles and St. Mary's County governments. (Pursuant to Section 8-403 of the Maryland Scenic and Wild Rivers Act.)
- 2) The commission will serve in an advisory capacity and meet on a regular basis. Specific commission functions and roles should be specified in a bi-county resolution as directed by the county commissioners and agreed upon by the Maryland Department of Natural Resources.
- 3) The bi-county resolution should stipulate that the Wicomico River Commission use the Wicomico River Study and Management Plan as a guideline to provide advice to the county governments on land use planning and resource management. The commission will serve as an advocate for the wise use and management of the Wicomico River, Zekiah Swamp and their resources. This mandate will require that the commission identify any new or additional resource management issues and develop appropriate recommendations for the public and local, state and federal officials.
- 4) Under the direction and approval of Charles and St. Mary's Counties, the commission could submit grant proposals to non-profit organizations and state and federal agencies that may provide additional conservation program assistance for the Wicomico watershed.
- 5) Citizen representation on the commission will be determined by the county commissioners in cooperation with the Maryland Department of Natural Resources.
- 6) State and county planners (Charles and St. Mary's) should attend the meetings as ex-officio, non-voting members. They can provide technical assistance and coordinate commission actions with county and state objectives. The state should provide adequate staffing to offer such assistance.

FOOTNOTES

1. Alice J. Lippson, et al. Environmental Atlas of the Potomac Estuary, Martin Marietta Corporation, Baltimore, MD, 1979, p.20.
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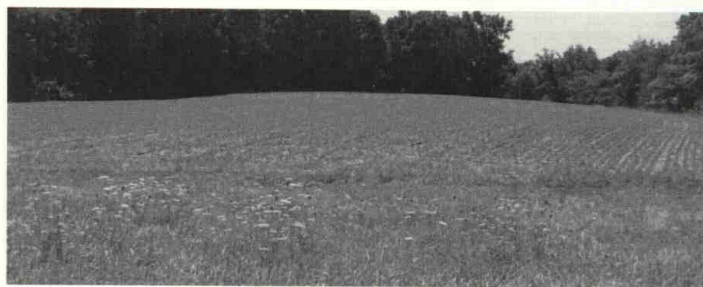
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Appendix A Soils

LAND USE LIMITATIONS BY SOIL SERIES



Lowlands farm meadow: headwaters of Chaptico Creek, St. Mary's County.



Upland farm field off Bryantown Road, Charles County.

Series	Septic Fields	Homes without Basements	Streets and Parking Lots
Beltsville	Severe. Slow Permeability	Slight.	Moderate. Seasonally perched water table
Bibb	Severe. High water table, flood hazard	Severe. High water table, flood hazard	Severe. High water table, flood hazard
Bourne	Severe. Slow permeability	Slight.	Moderate. Seasonally perched water table
Caroline	Severe. Slow Permeability	Slight.	Moderate. Slope
Chillum	Slight to moderate. Slow permeability	Slight.	Slight.
Croom	Severe. Slow permeability	Slight.	Moderate. Slope
Elkton	Severe. High water table, slow permeability	Severe. High water table, poor drainage	Severe. High water table, poor drainage
Evesboro	Slight.	Slight.	Slight
Faceville	Slight.	Slight.	Moderate. Slope
Gravelly Land	Severe. Slope	Severe. Slope	Severe. Slope
Keyport	Severe. Slow permeability	Slight.	Moderate. High water table
Magnolia	Slight	Slight.	Slight
Matapeake	Severe. High water table, slow permeability	Slight to moderate. Slope	Moderate. High water table
Mattapex	Severe. Slow permeability	Slight to moderate. Slope	Moderate. High water table
Othello	Severe. High water table, poor drainage	Severe. High water table, poor drainage	Severe. High water table, poor drainage
Sassafras	Slight to moderate. Slope	Slight to moderate. Slope	Slight to moderate. Slope
Swamp	Severe. Ponding	Severe. Ponding	Severe. Ponding
Tidal Marsh	Severe. Tidal high water table	Severe. Tidal high water table	Severe. Tidal high water table
Wicklam	Slight to moderate. Slope	Slight to moderate. Slope	Moderate to severe. Slope

Source: Soil Survey of Charles County and Soil Survey of St. Mary's County

Appendix B

Flora of the Wicomico River Watershed



TREES

Scientific Name

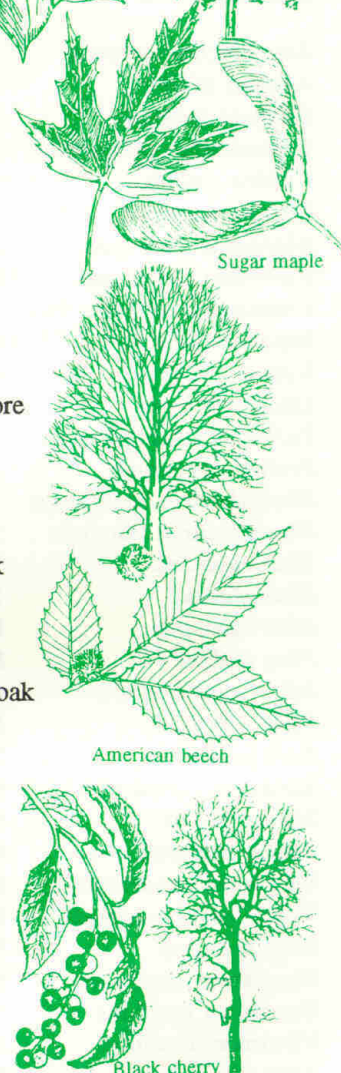
Common Name

<i>Acer rubrum</i>	Red maple
<i>Acer saccharum</i>	Sugar maple
<i>Alnus serrulata</i>	Hazel alder
<i>Asimina triloba</i>	Pawpaw
<i>Betula nigra</i>	River birch
<i>Carpinus caroliniana</i>	American hornbeam
<i>Carya cordiformis</i>	Bitternut hickory
<i>Carya glabra</i>	Pignut hickory
<i>Carya tomentosa</i>	Mockernut hickory
<i>Castanea dentata</i>	American chestnut
<i>Castanea mollissima</i>	Chinese chestnut
<i>Castanea pumila</i>	Allegheny chestnut
<i>Catalpa speciosa</i>	Catalpa
<i>Celtis occidentalis</i>	Hackberry
<i>Chionanthus virginicus</i>	Fringe tree
<i>Cornus florida</i>	Flowering dogwood
<i>Crataegus spp</i>	Hawthorn
<i>Diospyros virginiana</i>	Persimmon
<i>Fagus grandifolia</i>	American beech
<i>Fraxinus american</i>	White ash
<i>Fraxinus pennsylvanica</i>	Green ash
<i>Ilex opaca</i>	American holly
<i>Juglans nigra</i>	Black walnut
<i>Juniperus virginiana</i>	Eastern redcedar
<i>Liquidambar styraciflua</i>	Sweetgum
<i>Liriodendron tulipifera</i>	Tulip poplar
<i>Magnolia virginiana</i>	Sweetbay magnolia
<i>Nyssa sylvatica</i>	Black gum
<i>Ostrya virginiana</i>	Eastern hophornbeam

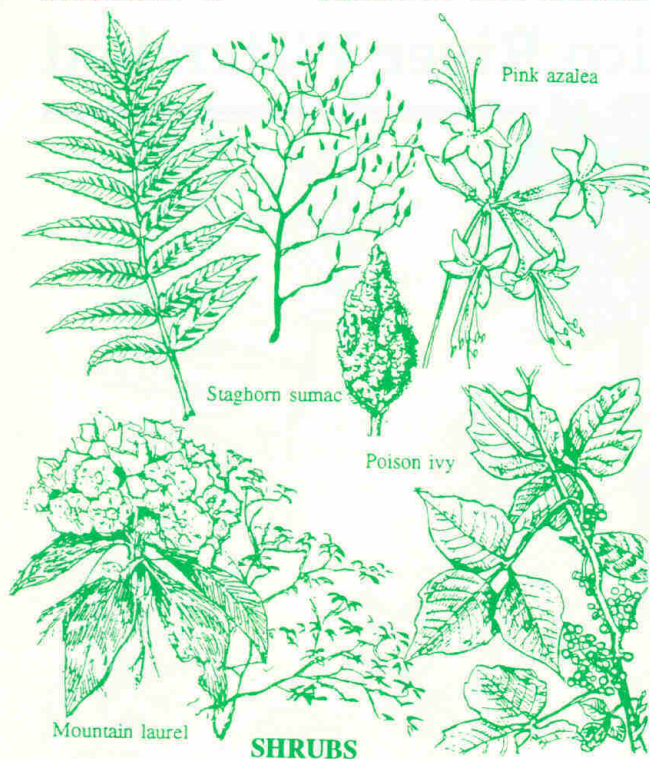
Scientific Name

Common Name

<i>Paulownia tomentosa</i>	Royal paulownia
<i>Picea abies</i>	Norway spruce
<i>Pinus echinata</i>	Shortleaf pine
<i>Pinus rigida</i>	Pitch pine
<i>Pinus sylvestris</i>	Scotch pine
<i>Pinus taeda</i>	Loblolly pine
<i>Pinus virginiana</i>	Virginia pine
<i>Platanus occidentalis</i>	American sycamore
<i>Populus grandidentata</i>	Bigtooth aspen
<i>Populus tremuloides</i>	Quaking aspen
<i>Prunus serotina</i>	Black cherry
<i>Quercus alba</i>	White oak
<i>Quercus bicolor</i>	Swamp white oak
<i>Quercus coccinea</i>	Scarlet oak
<i>Quercus falcata</i>	Southern red oak
<i>Quercus marilandica</i>	Blackjack oak
<i>Quercus michauxii</i>	Swamp chestnut oak
<i>Quercus palustris</i>	Pin oak
<i>Quercus phellos</i>	Willow oak
<i>Quercus prinus</i>	Chesnut oak
<i>Quercus rubra</i>	Northern red oak
<i>Quercus stellata</i>	Post oak
<i>Quercus velutina</i>	Black oak
<i>Robinia pseudoacacia</i>	Black locust
<i>Salix nigra</i>	Black willow
<i>Sassafras albidum</i>	Sassafras
<i>Taxodium distichum</i>	Bald cypress
<i>Ulmus alata</i>	Winged elm
<i>Ulmus americana</i>	American elm



WILDFLOWERS



SHRUBS

Scientific NameCommon Name

<i>Amerlanchier arborea</i>	Downy serviceberry
<i>Asimina triloba</i>	Pawpaw
<i>Campsis radicans</i>	Trumpet creeper
<i>Cephalanthus occidentalis</i>	Buttonbush
<i>Clethra alnifolia</i>	Sweet pepperbush
<i>Cornus amomum</i>	Red willow
<i>Elaeagnus umbellata</i>	Autumn olive
<i>Euonymus americanus</i>	Strawberry bush
<i>Gaylussacia dumosa</i>	Dwarf huckleberry
<i>Impatiens pallida</i>	Jewelweed
<i>Kalmia latifolia</i>	Mountain laurel
<i>Lindera benzoin</i>	Spicebush
<i>Parthenocissus quinquefolia</i>	Virginia Creeper
<i>Prunus virginiana</i>	Choke cherry
<i>Rhododendron nudiflorum</i>	Pink azalea
<i>Rhododendron viscosum</i>	Swamp azalea
<i>Rhus copallina</i>	Winged sumac
<i>Rhus glabra</i>	Smooth sumac
<i>Rhus radicans</i>	Poison ivy
<i>Rhus typhina</i>	Staghorn sumac
<i>Ribes rotundifolium</i>	Gooseberry
<i>Rosa multiflora</i>	Multiflora rose
<i>Rosa palustris</i>	Swamp rose
<i>Sambucus canadensis</i>	Common elder
<i>Smilax glauca</i>	Sawbrier
<i>Smilax rotundifolium</i>	Greenbrier
<i>Vaccinium angustifolium</i>	Low sweet blueberry
<i>Vaccinium corymbosum</i>	Highbush blueberry
<i>Vaccinium spp</i>	Vaccinium
<i>Vaccinium stamineum</i>	Deerberry
<i>Vaccinium vacillans</i>	Lowbush blueberry
<i>Viburnum dentatum</i>	Southern arrow-wood
<i>Vitis spp</i>	Grape

Scientific NameCommon Name

<i>Achillea millefolium</i>	Yarrow
<i>Agrimonia spp</i>	Agrimony
<i>Allium canadense</i>	Wild garlic
<i>Anemone lancifolia</i>	Wood anemone
<i>Antennaria plantaginifolia</i>	Plantain-leaved pussytoes
<i>Anthemis cotula</i>	Mayweed
<i>Apocynum medium</i>	Intermediate dogbane
<i>Arabis spp</i>	Field cress
<i>Arisaema atrorubens</i>	Jack-in-the-pulpit
<i>Asclepias spp</i>	Milkweed
<i>Astryum hypericoides</i>	St. Andrew's cross
<i>Asimina triloba</i>	Pawpaw
<i>Barbarea vulgaris</i>	Winter cress
<i>Campsis radicans</i>	Trumpet creeper
<i>Cassia fasciculata</i>	Partridge-pea
<i>Cassia nictitans</i>	Wild sensitive-plan
<i>Centaurea cyanus</i>	Cornflower
<i>Cephalanthus occidentalis</i>	Buttonbush
<i>Cerastium vulgatum</i>	Mouse-eared chickweed
<i>Chimaphila maculata</i>	Spotted wintergreen
<i>Chimaphila umbellata</i>	Pipsissewa
<i>Chionanthus virginicus</i>	Fringetree
<i>Choris spp</i>	Finger grass
<i>Chrysanthemum leucanthemum</i>	Ox-eye daisy
<i>Cichorium intybus</i>	Chicory
<i>Cicuta maculata</i>	Water hemlock
<i>Circaea quadrisulcata</i>	Enchanter's nightshade
<i>Claytonia virginica</i>	Spring beauty
<i>Clethra alnifolia</i>	Sweet pepperbush
<i>Coreopsis lanceolata</i>	Lance-leaved coreopsis
<i>Coreopsis verticillata</i>	Whorled coreopsis
<i>Cornus florida</i>	Flowering dogwood
<i>Cypripedium acaule</i>	Moccasin-flower
<i>Cypripedium spp</i>	Ladies slipper
<i>Daucus carota</i>	Queen Anne's lace
<i>Desmodium nudiflorum</i>	Naked-flowered tick-trefoil
<i>Desmodium spp</i>	Tick-trefoil
<i>Dianthus armeria</i>	Deptford pink
<i>Drosera intermedia</i>	Spatulate-leaved sundew
<i>Duchesnea indica</i>	Indian strawberry
<i>Echium vulgare</i>	Viper's bugloss
<i>Epifagus virginiana</i>	Beechdrops
<i>Epigaea repens</i>	Trailing arbutus
<i>Erigeron annuus</i>	Daisy fleabane
<i>Erythronium americanum</i>	Trout-lily
<i>Euonymus americanus</i>	Strawberry-bush
<i>Eupatorium coelestinum</i>	Mistflower
<i>Eupatorium pilosum</i>	Hairy thoroughwort
<i>Eupatorium sessilifolium</i>	Upland boneset
<i>Eupatorium spp</i>	Joe-Pye-weed
<i>Euphorbia corollata</i>	Flowering spurge
<i>Fragaria virginiana</i>	Common strawberry
<i>Galium spp</i>	Bedstraw
<i>Gentiana andrewsil</i>	Closed gentian
<i>Geranium carolinianum</i>	Carolina cranesbill

Trumpet creeper

Agrimony

Indian-tobacco

Blue violet

Red clover

Fragrant water-lily

Indian strawberry

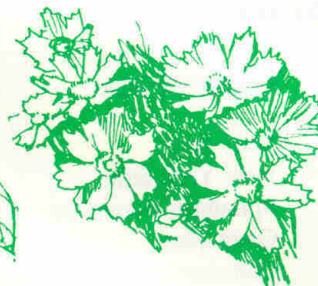
WILDFLOWERS

Scientific NameCommon Name

<i>Gerardia virinica</i>	Downy false foxglove
<i>Geum virginianum</i>	Rough avens
<i>Glechoma hederacea</i>	Gill-over-the-ground
<i>Goodyera spp</i>	Rattlesnake plantian
<i>Haberaria clavellata</i>	Small woodland orchis
<i>Hemerocallis fulva</i>	Day-lily
<i>Hieracium venosum</i>	Hawkweed
<i>Houstonia caerulea</i>	Rattlesnake-weed
<i>Houstonia purpurea</i>	Bluets
<i>Hypericum spp</i>	Largew houstonia
<i>Hypericum virginicum</i>	St. Johnswort
<i>Ilex laevigata</i>	Winterberry
<i>Impatiens pallida</i>	Jewelweed
<i>Kalmia latifolia</i>	Mountain laurel
<i>Drigia virginica</i>	Dwarf dandelion
<i>Lactuca canadensis</i>	Wild lettuce
<i>Lamium amplexicaule</i>	Henbit
<i>Lamium purpureum</i>	Purple dead nettle
<i>Leucothoe racemosa</i>	Fetterbush
<i>Lilium superbum</i>	Turk's-cap lily
<i>Linaria canadensis</i>	Old-field toadflax
<i>Lindera benaazoin</i>	Spicebush
<i>Linum virginianum</i>	Yellow flax
<i>Lobelia cardinalis</i>	Cardinal-flower
<i>Lobelia inflataaa</i>	Indian-tobacco
<i>Lonicera jaaponica</i>	Japanese honeysuckle
<i>Lugwigia alternifolia</i>	Seedbox
<i>Lysimachia ciliata</i>	Fringed loosestrife
<i>Magnolia virginiana</i>	Sweetbay magnolia
<i>Maianthemum canadense</i>	Wild lily-of-the-valley
<i>Medeola virginiana</i>	Indian cucumber-root
<i>Melampyrum lineare</i>	Cow-wheat
<i>Melilotus officinalis</i>	Yellow sweet clover
<i>Mitchella repens</i>	Partridge berry
<i>Monotropa hypopithys</i>	Pinesap
<i>Monotropa uniflora</i>	Indian-pipe
<i>Nymphaea odorata</i>	Fragrant water-lily
<i>Oxalis stricta</i>	Yellow wood-sorel
<i>Panax trifolius</i>	Dwarf ginseng
<i>Parthenocissus quinquefolia</i>	Virginia creeper
<i>Phytolacca americana</i>	Pokeweed
<i>Plantago major</i>	Plantain
<i>Podophyllum peltatum</i>	May apple
<i>Polygonatum biflorum</i>	Solomon's-seal
<i>Polygonum arifolium</i>	Halberd-leaved tearthumb
<i>Polygonum hydropiper</i>	Smartweed
<i>Pontederia cordata</i>	Pickerelweed
<i>Potentilla canadensis</i>	Dwarf cinquefoil
<i>Potentilla recta</i>	Rough-fruited cinquefoil
<i>Prunella vulgaris</i>	Selfheal
<i>Pvrola elliptica</i>	Shinleaf
<i>Ranunculus acris</i>	Buttercup
<i>Rhododendron nudiflorum</i>	Pink azalea
<i>Rhododendron viscosum</i>	Swamp azalea
<i>Rhus radicans</i>	Poison ivy



Winterberry



Lance-leaved coreopsis

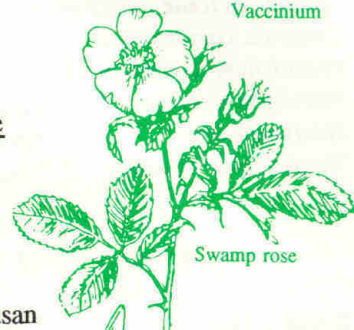


Vaccinium

WILDFLOWERS

Scientific NameCommon Name

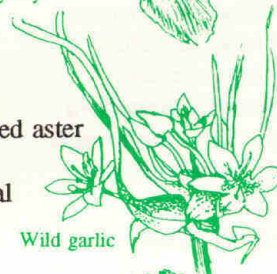
<i>Rosa carolina</i>	Pasture rose
<i>Rosa palustris</i>	Swamp rose
<i>Rubus spp</i>	Blackberry
<i>Rubus spp</i>	Raspberry
<i>Rudbeckia hirta</i>	Black-eyed susan
<i>Rumex acetosella</i>	Sheep sorrel
<i>Rumex crispus</i>	Curled dock
<i>Sagittaria spp</i>	Arrowhead
<i>Salvia lyrata</i>	Lyre-leaved sage
<i>Sambucus canadensis</i>	Elderberry
<i>Sarracenia purpurea</i>	Pitcher-plant
<i>Satureja vulgaris</i>	Wild basil
<i>Saururus cernuus</i>	Lizard's tail
<i>Scirpus spp</i>	Bulrush
<i>Scutellaria integrifolia</i>	Hyssop skullcap
<i>Scutellaria elliptica</i>	Hairy skullcap
<i>Senecio aureus</i>	Golden ragwort
<i>Seriocarpus asteroides</i>	Toothed white-topped aster
<i>Sisymbrium altissium</i>	Blue-eyed grass
<i>Smilacina racemosa</i>	False solomon's-seal
<i>Smilax glauca</i>	Sawbrier
<i>Smilax rotundifolia</i>	Greenbrier
<i>Sparganium spp</i>	Bur-reed
<i>Specularia perfoliata</i>	Venus' looking glass
<i>Stellaria graminea</i>	Lesser stitchwort
<i>Stellaria media</i>	Common chickweed
<i>Symplocarpus foetidus</i>	Skunk cabbage
<i>Taraxacum officinale</i>	Dandelion
<i>Thalictrum polygamum</i>	Tall meadow-rue
<i>Thalictrum spp</i>	Meadow-rue
<i>Tovara virginiana</i>	Virginia knotweed
<i>Trifolium arvense</i>	Rabbit's-foot clover
<i>Trifolium pratense</i>	Red clover
<i>Uvularia sessilifolia</i>	Wild oats
<i>Vaccinium spp</i>	Vaccinium
<i>Veratrum viride</i>	False Hellebore
<i>Verbascum thapsus</i>	Common mullein
<i>Viburnum dentatum</i>	Southern arrow-wood
<i>Viburnum acerifolium</i>	Mapleleaf viburnum
<i>Vicia cracca</i>	Cow vetch
<i>Viola blanda</i>	Sweet white violet
<i>Viola papilionacea</i>	Blue violet



Swamp rose



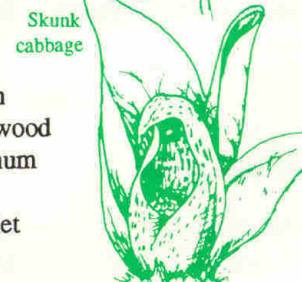
Day-lily



Wild garlic



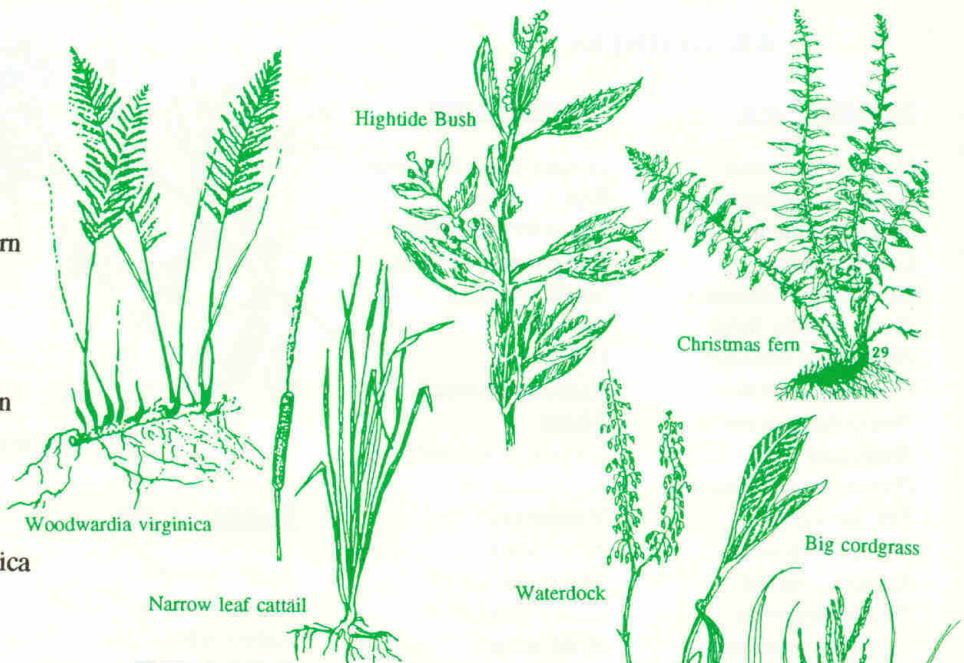
Joe-Pye-weed



Skunk cabbage

FERNS AND ALLIES

<u>Scientific Name</u>	<u>Common Name</u>
<i>Athyrium Filix-femina</i>	Lady fern
<i>Dryopteris noveboracensis</i>	New York fern
<i>Dryopteris spinulosa</i>	Spinulose wood fern
<i>Lycopodium obscurum</i>	Goundpine
<i>Lycopodium spp</i>	Club moss
<i>Lycopodium tristachyum</i>	Groundcedar
<i>Onoclea sensibilis</i>	Sensitive fern
<i>Ophioglossaceae vulgatum</i>	Adder's-tongue fern
<i>Osmunda cinnamomea</i>	Cinnamon fern
<i>Polystichum acrostichoides</i>	Christmas fern
<i>Pteridium aquilinum</i>	Bracken fern
<i>Sphagnum spp</i>	Sphagnum
<i>Woodwardia virginica</i>	Woodwardia virginica



TIDAL MARSH VEGETATION

<u>Scientific Name</u>	<u>Common Name</u>
<i>Carex spp</i>	Sedges
<i>Hibiscus moschentos</i>	Rose mallow
<i>Iva frutescens</i>	Hightide Bush
<i>Peltandra virginica</i>	Arrow Arum
<i>Polygonum spp</i>	Smartweeds
<i>Rosa palustris</i>	Swamp rose
<i>Rumex verticillatus</i>	Waterdock
<i>Scirpus americanus</i>	Common threesquare
<i>Scirpus fluviatilis</i>	River bulrush
<i>Scirpus lineatus</i>	Bulrush
<i>Spartina alterniflora</i>	Saltmarsh cordgrass
<i>Spartina cynosuroides</i>	Big cordgrass
<i>Typha angustifolia</i>	Narrow leaf cattail
<i>Typha latifolia</i>	Common cattail
<i>Zizania aquatica</i>	Wild rice

FRESHWATER VASCULAR PLANTS

<u>Scientific Name</u>	<u>Common Name</u>
<i>Ceratophyllum demersum</i>	Coontail
<i>Elodea canadensis</i>	Common waterweed
<i>Myriophyllum spicatum</i>	Eurasian water milfoil
<i>Najas flexilis</i>	Bushy pondweed
<i>Najas guadalupensis</i>	Southern naiad
<i>Potamogeton crispus</i>	Curly pondweed
<i>Potamogeton nodosus</i>	Floating pondweed
<i>Potamogeton pectinatus</i>	Sago pondweed

FRESHWATER ALGAE

<u>Scientific Name</u>	<u>Common Name</u>
<i>Chlorophyta</i>	Green algae
<i>Cyanophyta</i>	Blue-green algae

ESTUARINE VASCULAR PLANTS

<u>Scientific Name</u>	<u>Common Name</u>
<i>Myriophyllum spicatum</i>	Eurasian water milfoil
<i>Potamogeton perfoliatus</i>	Redhead grass
<i>Ruppia maritima</i>	Widgeon grass
<i>Vallisneria americana</i>	Wild celery
<i>Zannichellia palustris</i>	Horned pondweed

ESTUARINE ALGAE

<u>Scientific Name</u>	<u>Common Name</u>
<i>Bacillariophyta</i>	Diatoms
<i>Chlorophyta</i>	Green algae
<i>Chrysophyta</i>	Golden-brown algae
<i>Cryptophyta</i>	Blue and red flagellates
<i>Cyanophyta</i>	Blue-green algae
<i>Euglenophyta</i>	Euglenoids
<i>Phyrrhophyta</i>	Brown algae
<i>Ulva lactuca</i>	Sea lettuce



Sources:

- 1) Brown, Melvin L. Herbaceous Plants of Maryland, Port City Press, Baltimore, MD and University of Maryland, College Park, MD, 1984.
- 2) Brown, Russell G. Woody Plants of Maryland, Port City Press, Baltimore, MD and Frostburg State University, Frostburg, MD, 1972.
- 3) Brumbley, William. Flora and Fauna of the Zekiah Swamp/Wicomico River in Southern Maryland, unpublished, Maryland Forest Service, LaPlata, MD, 1990.
- 4) Hurley, Linda M. Field Guide to the Submerged Aquatic Vegetation of the Chesapeake Bay, U.S. Fish and Wildlife Service, Annapolis, MD, 1990.
- 5) Lippson, Alice J., et al. Environmental Atlas of the Potomac Estuary, Martin Marietta Corporation, Columbia, MD, 1979.
- 6) Maryland Department of Natural Resources. Chesapeake Bay SAV Aerial Survey, Coastal Resources Division, 1990.

Appendix C

Fauna of the Wicomico River Watershed

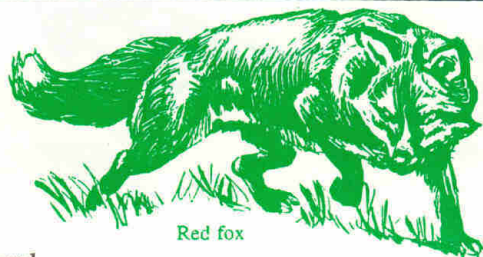
MAMMALS

Scientific Name

Blarina carolinensis
Castor canadensis
Didelphis virginiana
Glaucomys volans
Lasiurus borealis
Lasionycteris noctivagans
Lutra canadensis
Marmota monax
Mephitis mephitis
Microtus pennsylvanicus
Mustela frenata
Mustela vison
Myotis keenii
Myotis lucifugus
Odocoileus virginianus
Ondatra zibethica
Oryzomys palustris
Peromyscus leucopus
Pipistrellus subflavus
Procyon lotor
Scalopus aquaticus
Sciurus carolinensis
Sorex cinereus
Sylvilagus floridanus
Tamias striatus
Urocyon cinereoargenteus
Vulpes fulva

Common Name

Short-tailed shrew
 Beaver
 Opossum
 Southern flying squirrel
 Hoary bat
 Silver-haired bat
 River otter
 Woodchuck
 Striped skink
 Meadow vole
 Longtail weasel
 Mink
 Keen myotis
 Little brown myotis
 Whitetail deer
 Muskrat
 Rice rat
 White-footed mouse
 Eastern pipistrel
 Raccoon
 Eastern mole
 Eastern gray squirrel
 Masked shrew
 Eastern cottontail rabbit
 Eastern chipmunk
 Gray fox
 Red fox



Red fox



Raccoon



Muskrat



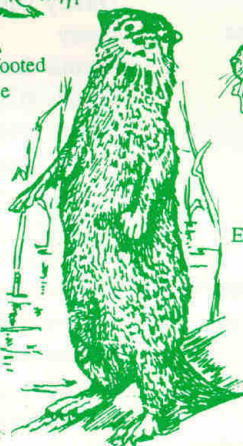
White-footed mouse



Eastern cottontail rabbit



Opossum



River otter



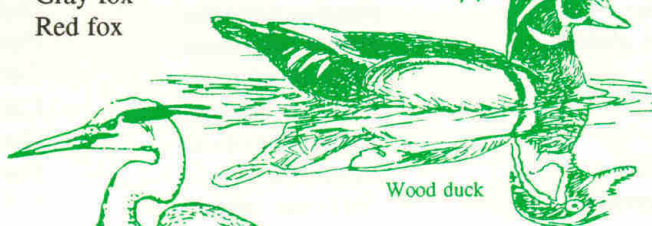
Eastern chipmunk



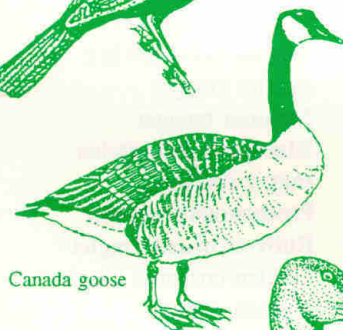
Whitetail deer



Red-winged blackbird



Wood duck



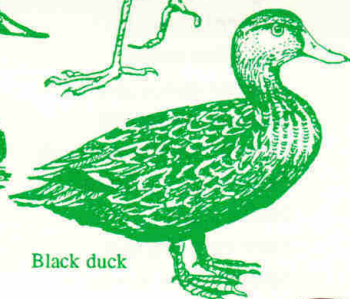
Canada goose



Great blue heron



Canvasback



Black duck

BIRDS

Scientific Name

Accipiter cooperii
Actitis macularia
Aegolius acadicus
Agelaius phoeniceus
Aix sponsa
Ammodramus savannarum
Anas clypeata
Anas platyrhynchos
Anas rubripes
Archilochus colubris
Ardea herodias
Aythya valisineria
Bombycilla cedrorum
Branta canadensis

Common Name

Cooper's hawk
 Spotted sandpiper
 Saw-whet owl
 Red-winged blackbird
 Wood duck
 Grasshopper sparrow
 Northern shoveler
 Mallard
 Black duck
 Ruby-throated hummingbird
 Great blue heron
 Canvasback
 Cedar waxwing
 Canada goose

BIRDS

Scientific NameCommon Name

Bubo virginianus
Buteo jamaicensis
Buteo lineatus
Buteo platypterus
Butorides striatus
Caprimulgus vociferus
Cardinalis cardinalis
Carduelis pinus
Carduelis tristis
Carpodacus mexicanus
Cathartes aura
Catharus fuscescens
Catharus guttatus
Catharus ustulatus
Certhis americana
Ceryle alcyon
Chaetura pelagica
Charadrius vociferus
Chordeiles minor
Coccothraustes vespertinus
Coccyzus americanus
Colaptes auratus
Colinus virginianus
Contopus virens
Corvus brachyrhynchos
Corvus ossifragus
Cyanocitta cristata
Dendroica caerulescens
Dendroica castanea
Dendroica cerulea
Dendroica coronata
Dendroica discolor
Dendroica petechia
Dendroica pinus
Dendroica striata
Dryocopus pileatus
Dumetella carolinensis
Empidonax virescens
Eremophila alpestris
Euphagus carolinus
Falco sparverius
Gavia immer
Geothlypis trichas
Haliaeetus leucocephalus
Helmithos vermivorus
Hirundo rustica
Hylocichla mustelina
Icterus virens
Icterus spurius
Junco hyemalis
Melanerpes carolinus
Melanerpes erythrocephalus
Meleagris gallopavo
Melospiza georgiana
Melospiza melodia

Great horned owl
 Red-tailed hawk
 Red-shouldered hawk
 Broad-winged hawk
 Green-backed heron
 Whip-poor-will
 Northern cardinal
 Pine siskin
 American goldfinch
 House finch
 Turkey vulture
 Veery
 Hermit thrush
 Swainson's thrush
 Brown creeper
 Belted kingfisher
 Chimney swift
 Killdeer
 Common nighthawk
 Evening grosbeak
 Yellow-billed cuckoo
 Yellow-shafted flicker
 Bobwhite quail
 Eastern wood pewee
 American crow
 Fish crow
 Blue jay
 Black-throated blue warbler
 Bay-breasted warbler
 Cerulean warbler
 Yellow-rumped warbler
 Prairie warbler
 Yellow warbler
 Pine warbler
 Blackpoll warbler
 Pileated woodpecker
 Gray catbird
 Acadian flycatcher
 Horned lark
 Rusty blackbird
 American kestrel
 Common loon
 Common yellowthroat
 Bald eagle
 Worm-eating warbler
 Barn swallow
 Wood thrush
 Yellow-breasted chat
 Orchard oriole
 Slate-colored junco
 Red-bellied woodpecker
 Red-headed woodpecker
 Wild turkey
 Swamp sparrow
 Song sparrow

Belted kingfisher



Yellow warbler



House wren



American kestrel



Red-tailed hawk

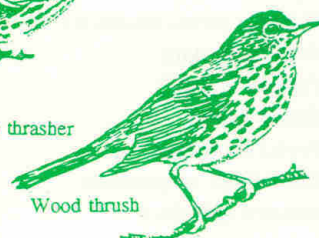


Pileated woodpecker



Brown thrasher

BIRDS



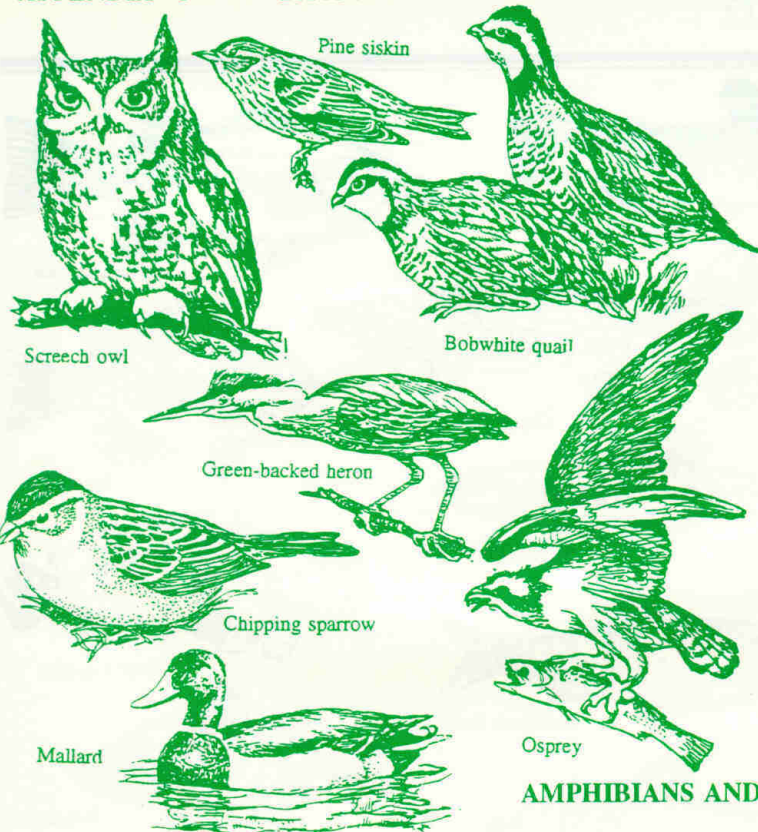
Wood thrush

Scientific NameCommon Name

Mimus polyglottos
Mniotilta varia
Molothrus ater
Myiarchus crinitus
Otus asio
Oxyura jamaicensis
Pandion haliaetus
Parula americana
Parus bicolor
Parus carolinensis
Passer domesticus
Passerella iliaca
Passerina cyanea
Picoides pubescens
Picoides villosus
Pipilo erythrophthalmus
Piranga olivacea
Piranga rubra
Poliophtila caerulea
Progne subis
Protonotaria citrea
Regulus calendula
Regulus satrapa
Sayornis phoebe
Scolopax minor
Seiurus aurocapillus
Seiurus motacilla
Seiurus noveboracensis
Setophaga ruticilla
Sialia sialis
Sitta carolinensis
Sphyrapicus varius

Mockingbird
 Black-and-white warbler
 Brown-headed cowbird
 Great crested flycatcher
 Screech owl
 Ruddy duck
 Osprey
 Parula warbler
 Tufted titmouse
 Carolina chickadee
 House sparrow
 Fox sparrow
 Indigo bunting
 Downy woodpecker
 Hairy woodpecker
 Rufous-sided towhee
 Scarlet tanager
 Summer tanager
 Blue-gray gnatcatcher
 Purple martin
 Prothonotary warbler
 Ruby-crowned kinglet
 Golden-crowned kinglet
 Eastern phoebe
 American woodcock
 Ovenbird
 Louisiana waterthrush
 Northern waterthrush
 American redstart
 Eastern bluebird
 White-breasted nuthatch
 Yellow-bellied sapsucker

BIRDS

Scientific NameCommon Name

Spizella passerina
Spizella pusilla
Strix varia
Sturnella magna
Sturnus vulgaris
Tachycineta bicolor
Thryothorus ludovicianus
Toxostoma rufum
Troglodytes aedon
Turdus migratorius
Tyrannus tyrannus
Vireo flavifrons
Vireo griseus
Vireo olivaceus
Vireo solitarius
Wilsonia citrina
Zonotrichia albicollis

Chipping sparrow
 Field sparrow
 Barred owl
 Eastern meadowlark
 European starling
 Tree swallow
 Carolina wren
 Brown thrasher
 House wren
 American robin
 Eastern kingbird
 Yellow-throated vireo
 White-eyed vireo
 Red-eyed vireo
 Solitary vireo
 Hooded warbler
 White-throated sparrow

AMPHIBIANS AND REPTILES

Scientific NameCommon Name

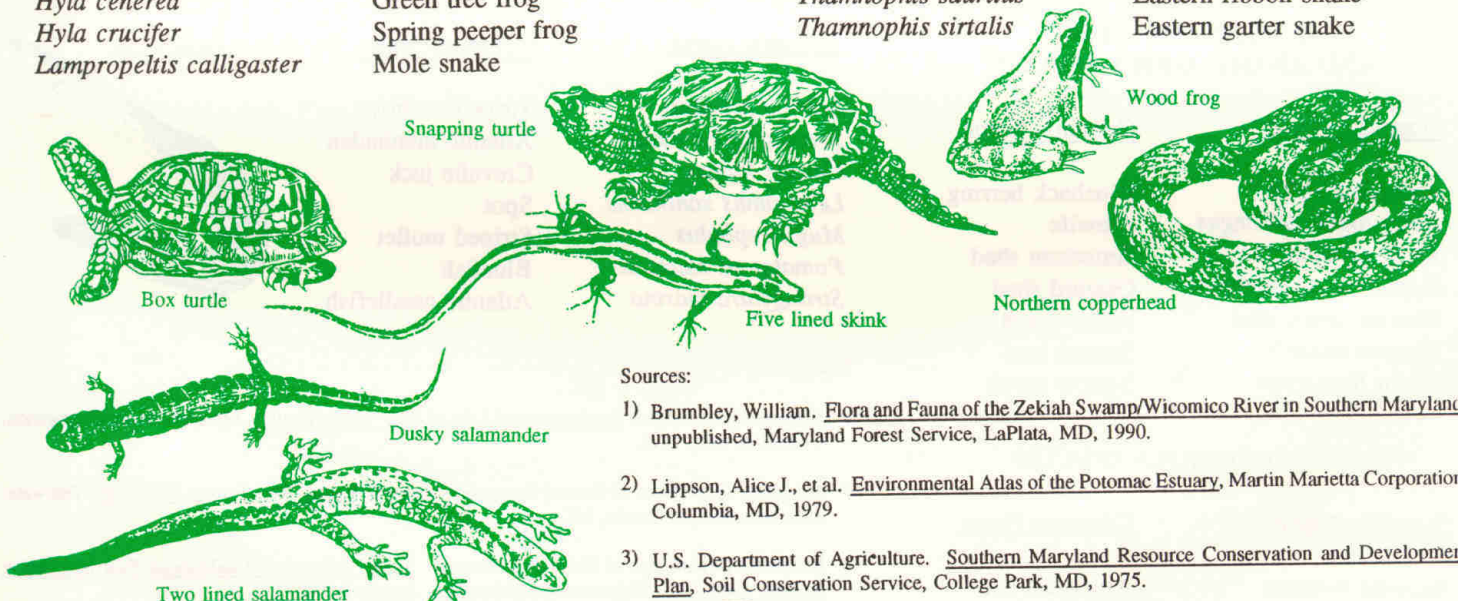
Agkistrodon contortrix
Carphophis amoenus
Chelydra serpentina
Chrysemys picta
Clemmys guttata
Coluber constrictor
Desmognathus fuscus
Elaphe guttata
Elaphe obsoleta
Eumeces fasciatus
Eumeces laticeps
Eurycea bislineata
Heterodon platyrhinos
Hyla cinerea
Hyla crucifer
Lampropeltis calligaster

Northern copperhead
 Eastern worm snake
 Snapping turtle
 Eastern painted turtle
 Spotted turtle
 Black racer snake
 Dusky salamander
 Corn snake
 Black rat snake
 Five lined skink
 Broad headed skink
 Two lined salamander
 Eastern hognose snake
 Green tree frog
 Spring peeper frog
 Mole snake

Scientific NameCommon Name

Lampropeltis getulus
Malaclemys terrapin
Natrix sipedon
Opheodrys aestivus
Plethodon cinereus
Rana catesbeiana
Rana clamitans
Rana sylvatica
Scincella lateralis
Sternotherus odoratus
Storeria dekayi
Storeria occitumaculata
Terrapene carolina
Thamnophis sauritus
Thamnophis sirtalis

Eastern king snake
 Northern diamondback terrapin
 Northern water snake
 Rough green snake
 Redback salamander
 Bull frog
 Green frog
 Wood frog
 Ground skink
 Musk turtle
 Northern brown snake
 Northern red-bellied snake
 Box turtle
 Eastern ribbon snake
 Eastern garter snake



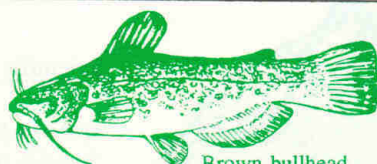
Sources:

- 1) Brumbley, William. Flora and Fauna of the Zekiah Swamp/Wicomico River in Southern Maryland, unpublished, Maryland Forest Service, LaPlata, MD, 1990.
- 2) Lippson, Alice J., et al. Environmental Atlas of the Potomac Estuary, Martin Marietta Corporation, Columbia, MD, 1979.
- 3) U.S. Department of Agriculture. Southern Maryland Resource Conservation and Development Plan, Soil Conservation Service, College Park, MD, 1975.

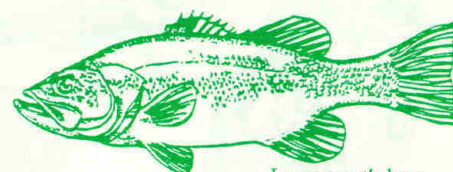
Appendix D Finfish

FRESHWATER SPECIES

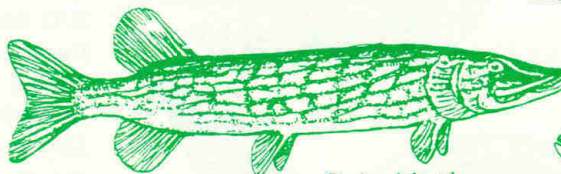
<u>Scientific Name</u>	<u>Common Name</u>
<i>Catostomus commersoni</i>	White sucker
<i>Cyprinus carpio</i>	Carp
<i>Erimyzon oblongus</i>	Creek chubsucker
<i>Esox niger</i>	Chain pickerel
<i>Etheostoma olmstedii</i>	Tessellated darter
<i>Hybognathus nuchalis</i>	Silvery minnow
<i>Ictalurus catus</i>	White catfish
<i>Ictalurus nebulosus</i>	Brown bullhead
<i>Lepomis gibbosus</i>	Pumpkinseed
<i>Lepomis macrochirus</i>	Bluegill
<i>Micropterus salmoides</i>	Largemouth bass
<i>Notemigonus crysoleucas</i>	Golden shiner
<i>Notropis hudsonius</i>	Spottail shiner
<i>Okkelbergia aepyptera</i>	Least brook lamprey
<i>Pomoxis nigromaculatus</i>	Black crappie
<i>Semotilus corporalis</i>	Fall fish



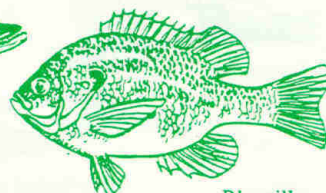
Brown bullhead



Largemouth bass



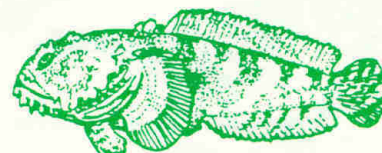
Chain pickerel



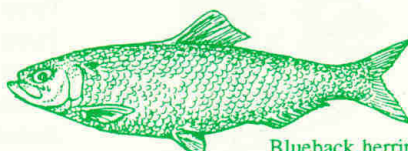
Bluegill



Banded killifish



Oyster toadfish



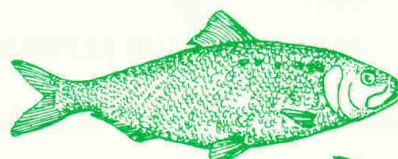
Blueback herring



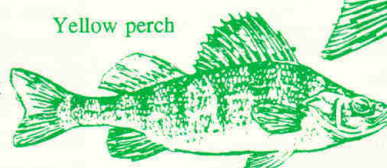
White perch

ESTUARINE SPECIES

<u>Scientific Name</u>	<u>Common Name</u>
<i>Anchoa mitchilli</i>	Bay anchovies
<i>Fundulus diaphanus</i>	Banded killifish
<i>Fundulus heteroclitus</i>	Mummichog
<i>Fundulus majalis</i>	Striped killifish
<i>Gasterosteus aculeatus</i>	Threespine stickleback
<i>Gobiosox strumosus</i>	Skilletfish
<i>Gobiosoma boscii</i>	Naked goby
<i>Membras martinica</i>	Rough silverside
<i>Memidia beryllina</i>	Tidewater silverside
<i>Memidia memidia</i>	Atlantic silverside
<i>Opsanus tau</i>	Oyster toadfish
<i>Syngnathus fuscus</i>	Northern pipefish



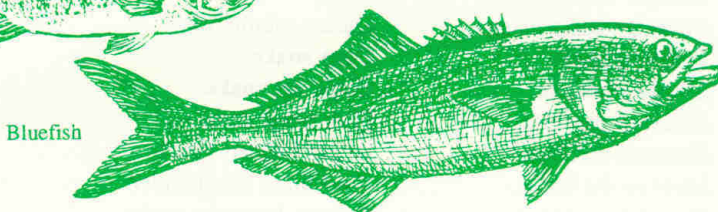
American shad



Yellow perch



Striped bass



Bluefish

MARINE SPECIES

SEMI-ANADROMOUS AND ANADROMOUS SPECIES

<u>Scientific Name</u>	<u>Common Name</u>
<i>Alosa aestivalis</i>	Blueback herring
<i>Alosa pseudoharengus</i>	Alewife
<i>Alosa sapidissima</i>	American shad
<i>Dorosoma cepedianum</i>	Gizzard shad
<i>Morone americana</i>	White perch
<i>Morone saxatilis</i>	Striped bass
<i>Perca flavescens</i>	Yellow perch

<u>Scientific Name</u>	<u>Common Name</u>
<i>Anchoa hepsetus</i>	Striped anchovy
<i>Brevoortia tyrannus</i>	Atlantic menhaden
<i>Caranx hippos</i>	Creville jack
<i>Leiostomus xanthurus</i>	Spot
<i>Mugil cephalus</i>	Striped mullet
<i>Pomatomus saltatrix</i>	Bluefish
<i>Strongylura marina</i>	Atlantic needlefish

American eel



Sources:

- 1) Lippson, Alice J., et al. Environmental Atlas of the Potomac Estuary, Martin Marietta Corporation, Columbia, MD, 1979.
- 2) Maryland Department of Natural Resources. Juvenile Striped Bass Survey 1980-1989, Tidewater Administration, Annapolis, MD.
- 3) Maryland Department of Natural Resources. Small Tributaries Anadromous Fish Monitoring Survey, 1988-1989, Tidewater Administration, Annapolis, MD.

CATADROMOUS SPECIES

<u>Scientific Name</u>	<u>Common Name</u>
<i>Anguilla rostrata</i>	American eel

Appendix E

Rare, Threatened and Endangered Species

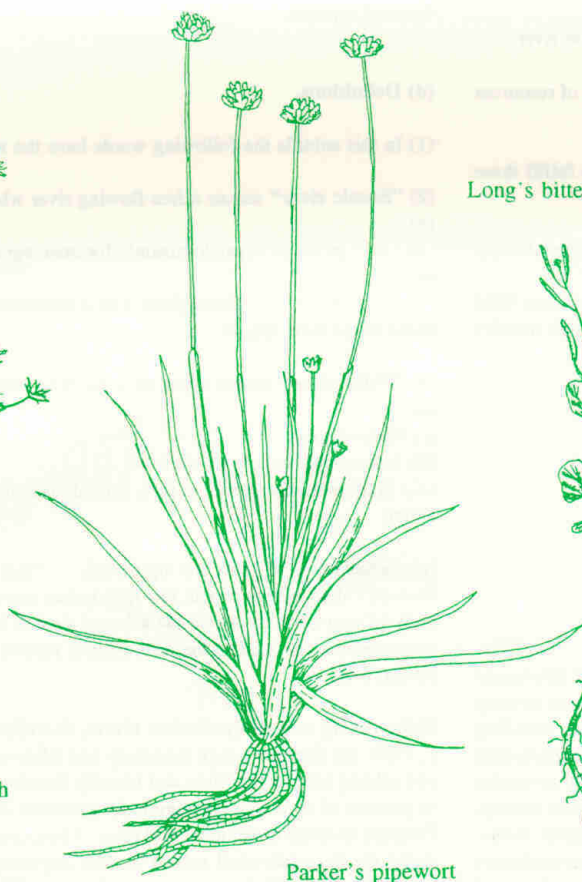
<u>Scientific Name</u>	<u>Common Name</u>	<u>Status</u>
<i>Cardamine longii</i>	Long's bittercress	State Endangered
<i>Crassula aquatica</i>	Pygmyweed	State Endangered-Extirpated
<i>Eriocaulon parkeri</i>	Parker's pipewort	State Endangered
<i>Gentiana villosa</i>	Striped gentian	State Endangered
<i>Haliaeetus leucocephalus</i>	Bald eagle	Federal and State Endangered
<i>Ilex decidua</i>	Deciduous holly	State Threatened
<i>Juncus caesariensis</i>	New Jersey rush	State Endangered-Extirpated
<i>Parnassia asarifolia</i>	Kidney leaf grass-of-parnassas	State Endangered
<i>Polygonum robustius</i>	Stout smartweed	State Endangered-Extirpated
<i>Rhynchospora corniculata</i>	Short-bristled hornedrush	State Endangered
<i>Sarracenia purpurea</i>	Northern pitcher plant	State Threatened
<i>Zalex triotis</i>	Dwarf prairie willow	State Endangered-Extirpated



American Bald Eagle
Haliaeetus leucocephalus



New Jersey rush

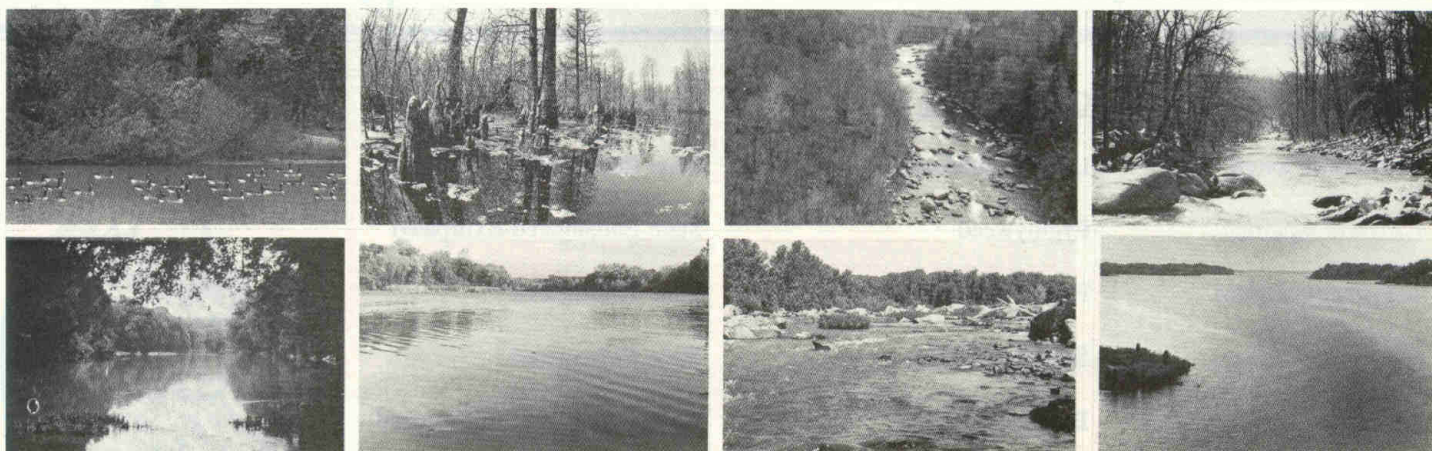


Parker's pipewort

Long's bittercress



Short-bristled hornedrush



Left to right, MARYLAND SCENIC RIVERS: Patuxent, Pocomoke, Youghiogheny, Deer Creek, Monocacy, Anacostia, Potomac, Severn.

MARYLAND SCENIC AND WILD RIVERS ACT

Article - Natural Resources

Title 8 - Water and Water Resources

Subtitle 4. Scenic and Wild Rivers Review Board and Related Program.

§ 8-401. Declaration of policy.

Many of the rivers of Maryland or portions of them and their related adjacent land areas possess outstanding scenic, geologic, ecologic, historic, recreational, agricultural, fish, wildlife, cultural and other similar values. The policy of the State is to

- preserve and protect the natural values of these rivers,
- enhance their water quality, and
- fulfill vital conservation purposes by wise use of resources within their surrounding environment.

Development of a Scenic and Wild Rivers Program is desirable to fulfill these purposes.

§ 8-402. Establishment and administration of Program; study of Deer Creek.

(a) **Establishment of Program; rivers included.** There is a Scenic and Wild Rivers Program. The following rivers, including their tributaries, are initially included in the Program:

Anacostia
Deer Creek
Monocacy
Patuxent
Pocomoke
Potomac (in Montgomery and Frederick counties)
Severn
Wicomico in Charles County, and
Youghiogheny.

(b) **Administration of Program.** The Secretary shall administer the provisions of this subtitle. The Secretary shall formulate and implement a program to carry out the policy under § 8-401 of this subtitle for each designated river including any other river designated subsequently as part of the system. The Program shall provide for the preparation of a plan and for the wise management of resources according to the policy under § 8-401 of this subtitle. Activities such as fishing, hunting, hiking, horseback riding, natural and geological interpretation, scenic appreciation, and other programs by which the general public can appreciate and enjoy the value of these areas as scenic and wild rivers in a setting of natural solitude shall be featured in a management plan to the extent these activities are practicable in the scenic or wild river.

(c) **Study of Deer Creek.** The Secretary shall prepare a study and plan for the use and development of the water and related land resources of Deer Creek in Harford County. The study and plan shall evaluate Deer Creek as a water, agricultural, and scenic resource, and evaluate its shoreline and related land in terms of zoning, parks, and recreational areas, public and private use. The study and plan shall be made in consultation and cooperation with every affected unit of Harford County. Upon completion, the Secretary shall file the study and plan with appropriate recommendations with the Harford County Planning Commission, the Harford County executive, and the Harford County Council for inclusion and implementation in the county's land use planning and zoning as the county deems appropriate. The original plan for Deer Creek in Harford County as approved under this section may be changed or restudied only if the Deer Creek local Scenic and Wild River Advisory Board and the Harford County Council approve.

(d) Definitions.

(1) In this subtitle the following words have the meaning indicated.

(2) **"Scenic river"** means a free-flowing river whose shoreline and related land are

- predominantly forested, agricultural, grassland, marshland,
- or
- Swampland with a minimum of development for at least 2 miles of the river length.

(3) **"Wild river"** means a free-flowing river whose shoreline and related land are:

- (i) Undeveloped;
- (ii) Inaccessible except by trail; or
- (iii) Predominantly primitive in a natural state for at least 4 miles of the river length

(e) **Submission of plan for approval.** -- Upon completion of the plan, the Secretary shall submit it with any appropriate recommendations to the governing body of every county where the affected river is located, for their approval and recommendations, and to the next regular session of the General Assembly for its approval.

(f) **Inventory and study of other rivers, shoreline and related land.** -- By July 1, 1990, the Secretary shall inventory and study every other river and shoreline and related land in the State and identify the rivers and their related shorelines or portions of them that are eligible for inclusion into the Scenic and Wild Rivers Program as either a scenic or wild river. Upon completion of each inventory and study, the Secretary shall submit it, with any recommendations for additions to the scenic and wild rivers system, to the governing body of every county where the river is located, for their approval and recommendations, and to the next regular session of the General Assembly.

§ 8-403. Scenic and Wild Rivers Review Board.

(a) Established; composition; chairman; compensation.

(1) There is a Scenic and Wild Rivers Review Board. The Board consists of the secretaries of Natural Resources, Agriculture, and the Environment and the Director of Planning and a member of the Garrett County Commissioners, who shall be a voting member of the Board only on matters pertaining to the wild portion of the Youghiogheny River.

(b) Duties. -- In addition to the duties set forth elsewhere in this subtitle, the Scenic and Wild Rivers Review Board shall:

(1) Review:

- (i) Any inventory, study, plan, rule, and regulation that is prepared under this subtitle;
- (ii) The recommendations on the inventory, study, plan rule, and regulation of the Secretary, any local governing body, or any local advisory board;

(2) Meet regularly; and

(3) Appoint, with the advice and consent of the appropriate local governing body, a local scenic and wild river advisory board for each river that is included in the Scenic and Wild Rivers Program.

(c) Advisory board - Composition; residence; selection of members.

(1) Each local scenic and wild river advisory board consists of at least 7 members, except for the Youghiogheny local Scenic and Wild River Advisory Board that consists of at least 8 members.

(2) Each member of a local scenic and wild river advisory board shall reside in the county through which the scenic and wild river flows.

(3) The Scenic and Wild Rivers Review Board shall select the members of each local advisory board as follows:

- (i) At least 2 members shall own land contiguous to the scenic or wild river, except for the Youghiogheny River where at least 3 members shall own land contiguous to that portion of the river designated by § 8-408(a) of this subtitle as a wild river;
- (ii) At least 2 members who own land that is not contiguous to the scenic or wild river,
- (iii) 1 member shall represent the local governing body; and
- (iv) 2 members from the county soil conservation district.

(d) Advisory Board -- Composition where wild river flows through more than one county. If a scenic or wild river flows through more than one county, the local advisory board shall consist of not more than the following members:

(1) 2 residents of each county through which the scenic or wild river flows who own land contiguous to the scenic or wild river;

(2) 2 residents of each county through which the scenic or wild river flows who do not own land contiguous to the scenic or wild river;

(3) 2 representatives of the local governing body of each county through which the scenic or wild river flows; and

(4) 1 representative of each soil conservation district through which the scenic or wild river flows.

(e) Advisory Board - Duties. Each local scenic and wild river advisory board shall:

(1) Review any inventory, study, plan, rule and regulation that is proposed under this subtitle and is applicable to any river in its jurisdiction;

(2) Make recommendations on the inventory, study, plan, rule, and regulation to its local governing body and to the Scenic and Wild Rivers Review Board.

(3) Select its own chairperson; and

(4) Adopt its own administrative rules and regulations for the operation of the local advisory board.

(f) Advisory Board -- Compensation; meetings.

(1) Each member of a local advisory board may not:

- (i) Receive compensation for service; or
- (ii) Be reimbursed for expenses incurred in travel or for attending meetings or performing any official duty.

(2) The Secretary shall schedule meetings for each local advisory board. However, in the event of emergencies, the chairperson of a local advisory board may schedule meetings for the local advisory board.

(g) Designation of Scenic River Advisory Boards by local governing bodies. Upon completion of an approved management plan, the local governing body may establish a Scenic River Advisory Board for each designated scenic or wild river within its jurisdiction. Each board, as constituted by the local authority, may recommend policies, laws, rules and regulations, in furtherance of the aims of this subtitle to the appropriate local governing body. If a scenic or wild river flows through more than one county, the Scenic River Advisory Board may consist of an equal number of members from each county.

§ 8-404. Recommendation of rivers, streams, and lands for inclusion in Scenic and Wild Rivers Program.

The Scenic and Wild Rivers Review Board may recommend for inclusion in the Scenic and Wild Rivers Program rivers, streams, and portions of rivers, streams, and tributaries, and the related adjacent lands which fall within the following descriptions:

(1) Trout streams and wetland areas;

(2) Spawning and propagation areas;

(3) Streams and rivers with scenic and aesthetic value of statewide significance;

(4) Existing or proposed public land adjacent to the rivers and streams;

(5) Sections of any river or stream where no development exists on either side of the river or stream for a distance of one-quarter mile from the mean high water line of the river or stream;

(6) Sections of any river or stream where limited development exists but is compatible with the wise use of the resources;

(7) Sections of any river or stream where encroachment is imminent and would lead to degradation of the river or stream, to some form of pollution, or adversely affect the intent of this subtitle; or

(8) Sections of any river or stream that are important as food production areas, areas supporting migratory waterfowl, and spawning areas for shellfish.

§ 8-405. Evaluation of waterway prior to approval of use or development plan.

Before specific plans for use and development of water and related land resources are approved, including constructing improvement, diversions, roadways, crossings, channelizations, locks, canals, or other uses that change the character of a river or waterway or destroy its scenic value, the Secretary shall give full consideration and evaluation of the river as a scenic and wild resource.

§ 8-406. Approval required for construction, operation, or maintenance of dams, etc.

A dam or other structure impeding the natural flow of a scenic and wild river may not be constructed, operated, or maintained in a scenic and wild river, and channelization may not be undertaken, unless the Secretary specifically approves.

MARYLAND SCENIC AND WILD RIVERS ACT

§ 8-407. Cooperation by State units.

Every state unit shall recognize the intent of the Scenic and Wild Rivers Program and take whatever action is necessary to protect and enhance the scenic and wild qualities of the designated river. The Secretary shall utilize the Scenic and Wild Rivers Program and all related information to assist and cooperate with any other State or local unit that exercises jurisdiction and authority over land use planning and management.

§ 8-408. Youghiogheny River - Designation as wild river; scenic corridor defined; boundaries; mining restrictions.

(a) **In general.** -- That segment of the Youghiogheny River between Millers Run and the southern corporate limits of Friendsville is designated a wild river.

(b) **"Scenic corridor" defined.** In §8-408 through §8-411 of this subtitle, "scenic corridor" means the visual corridor of the Youghiogheny River in that segment of the Youghiogheny River designated as wild that:

- (1) An individual can see from the river or its contiguous shorelines; and
- (2) The Secretary demonstrates by field investigation and defines by rules and regulations.

(c) Scenic corridor boundaries.

(1) By July 1, 1985, the Secretary shall define by field investigation the boundaries of the scenic corridor of the Youghiogheny River and submit to the property owner a map indicating the proposed boundaries which affect the property owner.

(2) The Youghiogheny local Scenic and Wild River Advisory Board shall verify the field investigation that the Secretary uses to define the extent of the scenic corridor.

(d) **Verification of boundaries; property owners.** - By July 1, 1985, the Secretary shall verify the boundaries of the scenic corridor of the Youghiogheny River with each property owner whose property is included in the scenic corridor:

- (1) (i) By an opportunity for an on-site review of the visual boundaries; or
- (ii) If an on-site review is not possible, by constructive notice in a certified letter, return receipt requested, bearing a postmark of the United States Postal Service, that states the boundaries of the scenic corridor in a way that is easily understood; and

(2) (i) The Secretary shall submit to each property owner a map indicating the proposed boundaries that affect the property owner.

(ii) If the property owner is not satisfied with the proposed boundaries shown to the property owner by the Department, within 30 days after the property owner has been shown the proposed boundaries, the property owner may request, in writing, a field survey of the boundaries.

(iii) If funding for the requested field survey is not immediately available:

- (1) The Department shall request funding for the field survey in the next fiscal budget; and
- (2) The field survey is contingent on that funding being provided.

(3) This subsection does not prevent the Secretary from proceeding to adopt rules and regulations to define the scenic corridor under subsections (b) and (c) of this section.

(e) Mining Restrictions.

(1) The provisions of this subsection do not apply to any area in the scenic corridor that has been mined and is not reclaimed.

(2) A person may not mine any minerals by the strip or open pit mining method in the scenic corridor.

§ 8-409. Same - Development; regulations for implementation of management plan, and use and development in scenic corridor.

(a) **Development defined.** In this section, "development" means any structure, appurtenance, other addition, modification, or alteration that is constructed, placed, or made on or to land or water.

(b) Regulations.

(1) In addition to other regulatory authorities that are provided by this subtitle, the Secretary, in coordination with the Youghiogheny River local Advisory Board and the Board of Garrett County Commissioners, shall prepare rules and regulations that are necessary to:

- (i) Implement the approved management plan for the Youghiogheny River; and
- (ii) Regulate use and development in the scenic corridor where the use and development would affect the primitive qualities and characteristic of the wild river segment of the Youghiogheny River.

(2) The Board of Garrett County Commissioners and the Scenic and Wild Rivers Review Board shall review the regulations of the Secretary before the Secretary adopts the regulations.

(3) On adoption of the regulations under paragraph (2) of this subsection, the Secretary shall administer and enforce the regulations.

§ 8-410. Youghiogheny River - Use of funds to purchase property; restrictions on use of water or land areas.

(a) If the prohibitions of § 8-408 of this subtitle or of any regulation that the Secretary adopts for the Scenic and Wild Rivers Program would constitute a taking of a property right without just compensation in violation of the Constitution of the United States or the Constitution of Maryland, funds under Program Open Space may be used to purchase or otherwise pay for any property that is taken, providing that the acquisition has been previously approved by the General Assembly.

(b) (1) As to any water or land areas within that portion of the Youghiogheny River that is designated by § 8-408 (a) of this subtitle as a wild river, funds under the open space program may be used to purchase any restriction, whether drafted in the form of an easement, covenant, or condition, that prohibits or limits the use of any of the water or land areas or any improvement or appurtenance to the water or land areas for any of the purposes listed in § 2-118 (b) of the Real Property Article.

(2) The restriction creates an incorporeal property interest in the water or land areas or the improvement or appurtenance thereto, so restricted, that is enforceable in both law and equity in the same manner as an easement or servitude with respect to the water or land areas or the improvement or appurtenance thereto, if the restriction is executed in compliance with the requirements of the Real Property Article for the execution of deeds or the Estates and Trust Article for the execution of wills.

§ 8-411. Protection of property owners' rights.

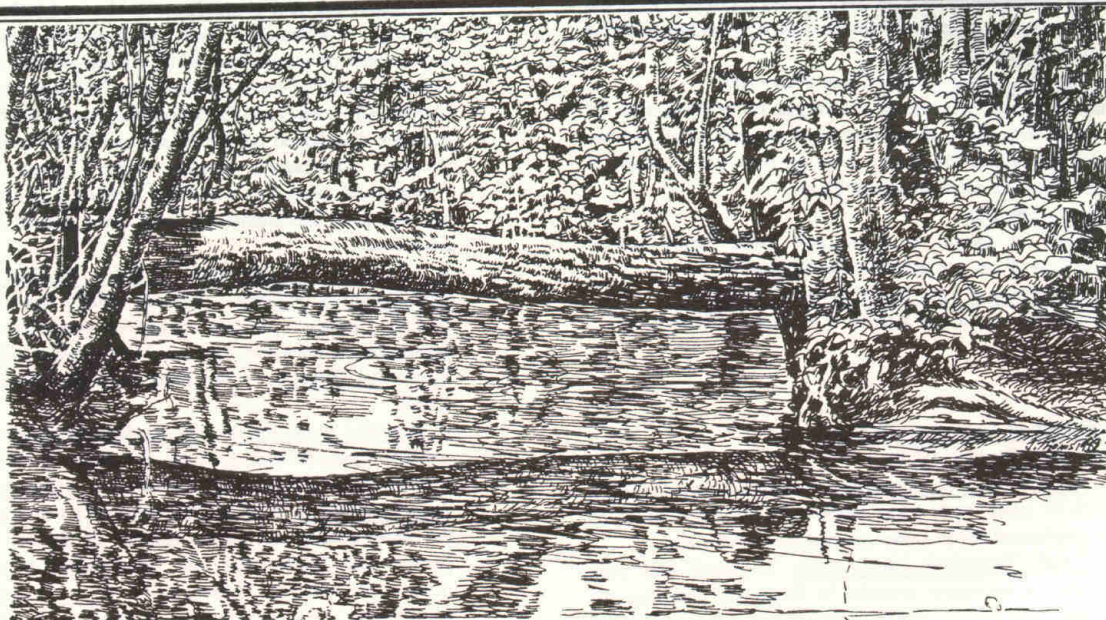
(a) In general.

(1) Notwithstanding the regulatory authorities that are provided by this subtitle, the Secretary, in the process of administering the Scenic and Wild Rivers Program, shall consider, protect, and ensure protection of the rights of property ownership.

(2) The Secretary may not adopt any rule or regulation that would constitute a taking of a right of property ownership that violates the Constitution of the United States or the Constitution of Maryland.

(b) **Limitations on acquisition of land by eminent domain.** - The State may not acquire by eminent domain land in the scenic corridor of the wild segment of the Youghiogheny River without first proving that the acquisition is necessary to preserve the wild segment of the Youghiogheny River, as provided in this subtitle.

Appendix G Index to Selected Government Agencies and Programs



INDEX TO SELECTED GOVERNMENT AGENCIES AND PROGRAMS INVOLVED WITH RIVER CONSERVATION IN MARYLAND

Sections I and II provide a general reference to selected Federal and State agencies involved with river conservation. Section III, "Index to Federal and State Assistance River for Conservation," provides a topical cross-reference of some of the available programs to citizen groups, organizations and local governments that are seeking assistance to protect and conserve Maryland's rivers.

I. Index to Selected Federal Agencies

Department of Defense,

Department of the Army, Corps of Engineers

Administers various Federal laws that regulate certain types of activities in waters of the U.S. including: wetlands; oceans; beach erosion control; flood control projects; and floodplain management services.

Construction Operations Division, Regulations Branch (Clean Water Act §404)

Provides jurisdiction over discharges of dredged and fill material into the waters of the U.S. which includes wetlands contiguous or adjacent to navigable waters and tributaries. If States adopt an EPA-approved program, Corps jurisdiction restricted to navigable waters and adjacent wetlands. Coordination with EPA required. Authorizes permits for structures and discharges in navigable waters, considering navigation, flood control, fish and wildlife management and environmental impacts. Conducts research on disposal and reuse of dredged material in order to minimize adverse impacts on wetlands.

Department of the Interior

National Park Service

Natural Landmarks and Theme Studies Unit (Register of Natural Landmarks; 16 U.S.C. 1a-5)

Studies and recommends areas for nationally significant natural areas that may qualify as natural landmarks or parks.

Rivers and Trails Conservation Assistance Program

The National Wild and Scenic Rivers Act of 1968 (16 U.S.C. 1271 et seq.)

Administers the nation's wild and scenic river system. The act developed a National Wild & Scenic River System and established a policy that certain selected rivers of the Nation possess outstanding remarkable

scenic, recreational, geological, fish and wildlife, historic, cultural, or other similar values and shall be preserved in a free flowing condition as federally designated, wild or scenic rivers. (See III, Program Assistance)

U.S. Fish and Wildlife Service

Branch of Permits and Licenses (National Fish & Wildlife Coordination Act; (16 U.S.C. 661 et seq.)

Consultation required on impacts to fish and wildlife of any Federal agency action which modifies or impacts waters of U.S. or any project that uses Federal funds; eg. bridges & highways.

Office of Biological Services--Wetlands

Classifies, identifies and maps wetlands in order to create a data base to aid management, particularly to the U.S.

Office of Biological Services--Coastal Ecosystem Project

Studies special problems associated with coastal areas.

Division of Ecological Services--Wetlands (Clean Water Act)

Required to assist states in developing dredge and fill programs under §208, must review State §404 programs prior to EPA approval.

Environmental Protection Agency

Responsible for area wide water quality research, planning and establishing federal standards that address nonpoint pollution, toxic pollutants, groundwater contamination, as well as wetland losses. Assists in local and state government planning, design and construction of wastewater treatment facilities.

Aquatic Protection Branch (Clean Water Act §404)

EPA and Corps set 404 guidelines regulating the discharge of dredged and fill material in sensitive areas. EPA also reviews projects claimed to be exempt under 404. EPA may prohibit use of a specific site for the disposal of dredged material on the basis of environmental impacts; also responsible for overseeing the transition of authority to States which develop 404 permit programs that meet EPA's regulatory requirements.

Chesapeake Bay Liaison Office

Provides administrative and technical support to network of regional committees, subcommittees and groups; maintains data base; disseminates public information and education. Participating Federal agencies: the United State Department of Agriculture; Army Corps

of Engineers and Department of the Interior. State agencies include: the Maryland Department of the Environment and Department of Natural Resources, as well The Commonwealth of Virginia. Participating organizations include: the Interstate Commission on the Potomac River Basin; Alliance for the Chesapeake; and Susquehanna River Basin Commission.

Office of Federal Activities (\$208 Clean Water Act)

Plans may now regulate certain discharges of dredged and fill material where states have an approved 404 program in accordance with Best Management Practices. Also governs water quality of areas under areawide waste treatment plans.

State Programs Division

May designate an aquifer as a principle water supply source, requiring review of any project affecting the aquifer.

Environmental Research Lab, Research and Development

Conducts research on various aspects of wetlands, pollution, etc.

United States Department of Agriculture (USDA)

Soil Conservation Service (SCS)

Rural Clean Water Program: Develops contracts lasting 5-10 years with rural landowners to share costs to implement BMPs under an approved \$208 plan.

Small Watershed Management: Technical and cost sharing assistance provided to States and localities for agricultural water management projects, which may affect wetlands.

Rural Development Act: SCS authorized to inventory, monitor and classify wetlands. Various inventories have been conducted. (See III, Program Assistance)

Agriculture Stabilization and Conservation Service (ASCS)

Conservation and Environmental Protection Division

Enters into 10 year contracts with landowners for preservation of wetlands determined to be important for the nesting and breeding of migratory waterfowl. Designed in part to preserve habitat of migratory waterfowl and other wildlife, increase fish and wildlife and recreation resources, promote management and planning and improve game habitat, through contracts and easement with landowners. (See III, Program Assistance)

Federal Emergency Management Agency

Provides for a flood insurance program to provide federally subsidized insurance against loss of real or personal property due to floods. Communities must adopt land use regulations which meet federal standards to qualify for insurance.

Department of Transportation

Environmental Division (National Department of Transportation Act of 1966; 49 U.S.C. 1651 et seq.)

Monitors, sponsors and approves Federally subsidized transportation projects; projects that occur on or affect public land must demonstrate that there is no "prudent and feasible alternative." Requires an environmental impact statement and/or assessment under Section 4(f) before any project affects public park land or open space. Policy is to protect wetlands to fullest extent possible during planning, construction and operation of federal and federally financed projects.

Department of Natural Resources

Office of the Secretary

Chesapeake Bay Restoration Program: Intensifies agency efforts to restore the Chesapeake with six areas of focus: living resources; water quality; population growth and development; public information and participation; public access; and governance.

Chesapeake Bay Trust: Promotes public awareness and participation

in the restoration and protection of the Chesapeake Bay. (See III, Program Assistance)

A. Public Lands and Forestry-centralizes and integrates all department activities pertaining to public land including acquisition; planning; construction and maintenance; management and recreational programming; public-private partnership development; and environmental easement donations. The departments respectively include: Greenways and Resources Planning which fulfills legislative mandate established by the Scenic and Wild Rivers Act; (See III, Program Assistance); Program Open Space; Engineering & Construction; State Forest and Park Service; Forestry Programs; and the Maryland Environmental Trust. (See section III, for program assistance.)

B. Resource Management- Fish, Heritage and Wildlife Administration: Wildlife - Conserve wildlife and wildlife resources. Natural Heritage: protects, conserves, researches and maintains populations of nongame, threatened and endanger animals and plants. Freshwater Fisheries: Administers programs related to freshwater finfish.

C. Resource Management- Boating Administration: Coordinates the various organizational elements of boating in DNR and develops vessel management plans on selected rivers. Chesapeake Bay Critical Area Commission: Provides Maryland with a strategy for protecting the water quality and natural habitats of the Bay with respect to present and future uses and development in the specifically designated 1,000 foot "critical area." Shore Erosion: Provides for the planning and funding for the stabilization of shorelines on lands adjacent to the Chesapeake Bay. Tidewater Administration: Provides overall direction, supervision and coordination with programs that are involved with the following resources of the bay and its tributaries: aquatic life; Bay freshwater, research and monitoring; power plants; and coastal zone management issues.

D. Resource Management- Maryland Environmental Service: Offers planning, licensing, engineering, financing, operating, and management services to the state's smaller communities and industries to help them meet new and rigorous standards for water supply and waste-water treatment. Maryland Geological Survey: Conducts surveys and prepares maps. Hydrogeology and Hydrology Program maintains a statewide water data network that provides information on river flows for land use planning, water supply and sewage facilities. Water Resources Administration: Responsible for the protection, management and development of Maryland' water resources and includes the following programs: Bureau of Mines Reviews and issues permits for surface mining or deep mining of coal, reclaims abandoned coal mines, abates acid mine drainage, and inspects coal mining sites to assure compliance with environmental and safety laws. Minerals, Oil and Gas Division - Reviews non-coal mining plans; inspects sites during operation, approves transfers of permits and overseas the reclamation of non-coal mining sites abandoned before 1977. Primarily inspects to protect surface and ground waters. Reviews and issues permits for oil and gas well drilling and production. Water and Wetlands Program Tidal Wetlands Division - Requires a permit for any work that may change tidal wetlands. The division visits wetlands, makes technical evaluations, and may require public hearings; they also provide advice to applicants on project plans to minimize damage to wetlands. NonTidal Wetlands Division - Implements a statewide program for the conservation, enhancement, regulation, creation and monitoring of nontidal wetlands. The division maintains a statewide wetlands inventory; and provides training workshops concerning nontidal wetlands. Grants or denies applications for permits to assure that construction in a waterway or its floodplain will not: create flooding on upstream or downstream property; the banks are protected from erosion; and fish habits and migration are maintained. Regulation .10 General Waterway Construction Permit denies general permits for all designated scenic/wild rivers. Regulation .11, Criteria for "Evaluating Permits" takes into full consideration the designation of a waterway as a State designated scenic/wild river; requires the approval of the Maryland Secretary of the Department of Natural Resources for all dam and channelization projects on those rivers.

INVOLVED WITH RIVER CONSERVATION IN MARYLAND

This responsibility has been delegated to the Director of the Water Resources Administration. Water Rights Division -Regulates the withdrawal and use of waters by requiring a permit to withdraw water from the ground, rivers or the Bay. The Planning and Engineering Section provide technical services to develop management plans for regional water resources, as well as providing details information about available ground water and surface water ; offers methods to solve local problems of meeting demands for water and coordinates with other states the management of water resources. Dam Safety Division - Reviews and approves permit applications to build, rebuild or repair any reservoir or dam. Regulation .05 Dams and Reservoirs--requires an environmental study that includes measures to preserve the aesthetic and scenic values and wild qualities of State scenic rivers. Enforcement and Services Program Assures permitted projects are implemented according to project plans and State regulations. Gathers data and information about water related resources.

Department of Agriculture

To provide the maximum protection possible for the consumer as well as promote the economic well being of farmers, food and fiber processors and businesses engaged in agricultural related operations, and to ensure that adverse environmental impacts of agriculture are minimized.



Tobacco farm in the Wicomico River Watershed.

Office of Plant Industries and Pest Management

Forest Pest Management Section

Includes gypsy moth control

Pesticide Regulation Section

Administer MD's pesticide's applicator's law.

Agricultural Land Preservation Foundation

Preserves prime farm lands by establishing agricultural preservation districts and purchasing development rights. (See III, Program Assistance)

Office of Resource Conservation

Implements agricultural soil conservation and water quality programs which have expanded with the Chesapeake Bay clean-up effort. Includes: statewide nutrient management programs, soil conservation and water quality protection, conservation reserve programs and agricultural water quality cost share programs, and staffing and operational support for 24 local Soil Conservation Districts.

Department of the Environment

Protects and restores Maryland's environment and safeguards the long term environmental health of Marylanders. This includes environmental regulation and services to foster sound environmental management such as capital and annual funding, planning and technical assistance to communities and businesses statewide.

Water Management Administration

Protects and restores ground and surface water quality, and ensures, through both public and private service and regulatory activities, that safe drinking water is provided.

Air Management Administration

Regulates industrial air pollution and automobiles emissions including acid rain and noise pollution.

Hazardous and Solid Waste Management Administration

Oversees the handling and disposal of: municipal and industrial solid waste; hazardous waste; petroleum products; medical waste; sewage sludge and industrial wastewater discharges. Provides emergency response to oil and hazardous materials incidents.

Sediment and Stormwater Administration

Controls water pollution by reducing impacts of sedimentation and stormwater runoff. (See III, Program Assistance.)

Toxics, Environmental Science and Health Administration

Protects the environment with respect to toxic substances and radiation hazards.

Department of Housing and Community Development

Division of Historical and Cultural Programs

Division involved with historic preservation and archaeology, cultural conservation and public interpretation.; a program within the division is the Maryland Historical Trust.

Maryland Historical Trust

Protects Maryland's historical properties and increases public knowledge and understanding; maintains and enhances Maryland's environmental quality; assists in managing environmental change; preserves beauty and increases aesthetic awareness; maintains and conserves Maryland's built and natural resources (housing stock, land and energy resources); and expands the role of preservation in assisting Maryland's economic development. (See III, Program Assistance)

Maryland Office of Planning

Provides for the prudent management of Maryland's resources and fosters a public awareness of the importance of planning. Serves as the state's primary planning agency and serves as the principal staff agency to the Office of the Governor for planning activities.

Comprehensive Planning Program

Monitors changes in development and land use throughout the State to forecast future land use demand and patterns.

Local Planning Assistance Program

(See III, Program Assistance)

Planning Data Services

Collects, analyzes and disseminates population, economic and housing data on Maryland.

Intergovernmental Assistance/State Clearinghouse

Administers the Maryland Intergovernmental Review and Coordination which ensures that proposals for certain State and Federal assistance are approved by all concerned parties before the proposal is submitted to the approving authority.

III. Index to Federal and State Assistance for River Conservation

CULTURAL RESOURCE PRESERVATION

Maryland Department of Housing and Community Development; Maryland Historical Trust

Historic Preservation Loan Program

For non-profit organizations, local governments and individuals; funds available for acquisition, rehabilitation or restoration of an historic property listed in or eligible for listing in the Maryland Register; applications accepted throughout the year; maximum repayment term is 20 years; successful applicants must convey perpetual preservation easement.

Historic Preservation Grant Program

For same as above; funds available for pre-development and development activities associated with acquisition, rehabilitation or restoration of historic properties listed in or eligible for listing in the Maryland Register, or a variety of historic preservation research, survey, education and promotion activities; State funds vary annually; application solicited once per state fiscal year; successful applicants must convey a perpetual historic preservation easements.

Certified Local Government Pass-Through Funds

50:50 matching grants made available to jurisdictions qualified by the National Park Service and by the State of Maryland. Applications solicited once per federal fiscal year with a November 1 deadline; federally appropriated funds vary annually.

Survey and Planning Grant in Aid Program

50:50 matching grants made available by the National Park Service through the Maryland Historical Trust; funds for: survey and registration projects; projects involving protection, planning and management of cultural resources and education/publication of site-specific studies; application solicited once per federal fiscal year with June 1 deadline; funds appropriated vary annually.

EASEMENTS

National Fish & Wildlife Foundation

Foundation works with the U.S. Fish & Wildlife Service and other Federal and state programs to protect fish, wildlife, and plant resources. The main office is located in Washington D.C.

- Promotes conservation through easements.
- Accepts conservation easements; can be used as a tax deduction and also reduce property, inheritance, gift, and capital gains taxes. A property with a national conservation easement is protected from State and local condemnation, while any of the following Maryland easements are protected from only local condemnation.

Maryland Agricultural Easements

Maryland Department of Agriculture

- Establishes agricultural land preservation districts through a county level board and records in the county's land records; preserves the land as agricultural for at least 5 years; once the District has been formed, an agricultural easement can be sold to the Foundation through a competitive bidding procedure.

Maryland Conservation Easements

Maryland Department of Natural Resources, Maryland Environmental Trust

- Protects open space, forested, agricultural lands, wetlands and other natural areas by accepting donations of land and conservation easements.
- Benefits of a conservation easement, (the Trust's primary land conservation tool) are: permanent protection of the land in its undeveloped state; a 15 year property tax credit on unimproved lands; a reduction of Federal estate taxes; a reduction of federal and state income taxes for up to six years (by considering the easement value as being a charitable donation); a reduction in Federal and State Inheritance Tax, Gift Tax, & Capital Gains Tax; and partial reimbursement for associated expenses incurred by the donor (appraisals, surveys, recordation fees, title searches, etc.)
- Provides technical assistance to interested parties to establish private, non-profit land trusts.

Maryland Historic Preservation Easements

Maryland Historical Trust

- Owners of historical areas or structures listed on the National Register of Historical Places are eligible to donate a historic preservation easement. The donation of an easement to the Trust has Federal and State tax benefits. Also after listing on the National Register, limited grants may be obtained for the rehabilitation of historical property; owners of designated, significant historic properties are eligible for state 502H tax deduction.

REFORESTATION (Private Lands)

ACP-Agricultural Conservation Program

USDA, Agricultural Stabilization & Conservation Service (ASCS)

- program availability varies from county to county.
- eg. In Frederick County, covers 65% of the costs associated with tree planting (trees, planting, site prep) -does not cover orchards, ornamental, or Christmas trees minimum of 1 acre, maximum payment \$3500 annually 10-year life
- numerous State technical advisors including Maryland DNR



FIP-Forest Incentive Program

USDA, Agricultural Stabilization & Conservation Service (ASCS)

- similar to ACP - only minimum 10 acres, maximum \$10,000 annually
- 10-year life (expected to retain for useful life though)
- 65% cost-share
- DNR technical advisors

WIP-Woodland Incentives Program

Maryland Department of Natural Resources

- 50% cost-share, 15-year life, maximum \$5000 annually covers 10-500 acres
- may not be combined with any other cost-share assistance programs
- DNR technical advisors

BIP-Buffer Incentive Program (Green Shores)

Maryland Department of Natural Resources

- established to plant forested buffers along the Bay and its tributaries
- \$200 per acre payment, minimum 1 acre and 50 foot buffer
- 10-year life
- may be combined with any other program (except WIP)
- Not available in Garrett County
- DNR technical advisors

Maryland Income Tax Modification for Reforestation and Timber Stand Improvement (COMAR 08.07.03)

Maryland Department of Natural Resources

- can deduct twice the cost of establishment from federal adjusted gross income for determining state income taxes
- 10-500 acres, minimum life 15 years
- DNR technical advisors; consult your accountant

Public Law 96-541

- federal tax law
- permits up to \$10,000 of capitalized reforestation costs annually to be eligible for a 10% investment tax credit (subtracted from taxes owed) and 7-year amortization
- consult your accountant

Other

- any state or federal cost share money received for tree plantings is not considered taxable income
- assistance is also available through ACP, FIP, WIP, and tax modifications for Timber Stand Improvement practices

FCMA-Forest Conservation and Management Agreement

Maryland Department of Natural Resources

- available through DNR
- 5 or more contiguously owned acres of forest land
- need Forest Resource Management Plan by a Registered Professional Forester - this plan must be followed exactly
- minimum 15-year life
- the land will be assessed at the agricultural rate and never be increased for the life of the agreement
- land inspected every 5 years by DNR -fee
- liable for all back taxes and penalties if agreement is violated.

INVOLVED WITH RIVER CONSERVATION IN MARYLAND

REFORESTATION (Public Lands)

Greenshores

Maryland Department of Natural Resources

- to establish forested stream buffers along waterways to control non-point source pollution
- materials provided by the DNR

Reforestation Law

Maryland Department of Natural Resources

- Projects using state money that require trees to be removed must be replaced by the developer on an acre per acre basis.
- Priority order of planting
 - On site
 - Off site on public lands within the county
- \$500 per acre be paid to a general fund for reforestation purposes until suitable land in the county is found.

Tree-mendous

Maryland Department of Natural Resources

- community, corporate, and individual programs for tree planting and care

Chesapeake Bay School Reforestation Project

County Forestry Boards to provide funds to local schools

- Students and schools organize and implement the planting of native forests that improves the quality of the Bay, local streams and waterways, enhances wildlife habitat and demonstrates the benefits of forests and trees in overall environmental protection.

WILDLIFE CONSERVATION

WHIP-Wildlife Habitat Improvement Program

Maryland Department of Natural Resources

- per acre bid for certain crops to remain unharvested for wildlife food
- annual agreement
- Not available in Garrett County
- DNR technical advisors

ACP-Permanent Wildlife Habitat

USDA, Agricultural Stabilization & Conservation Service (ASCS)

- for planting trees, shrubs, grasses, legumes
- 5-year life, 60% cost-share, maximum \$3500 annually
- DNR technical advisors



Shallow Water Areas for Wildlife

USDA, Agricultural Stabilization & Conservation Service (ASCS)

- to establish or restore shallow water areas for wildlife
- for structure installation and plantings
- 10-year life, 50% cost-share, \$3500 annually
- 1/2 acre minimum
- DNR technical advisors

Other

-Upland Habitat Restoration Program (UHRP) and the COVERTS Project - both designed to improve upland wildlife habitat, woodland and non-woodland

Maryland Department of Natural Resources, Maryland Cooperative Extension Service administration

- no payments

AGRICULTURE AND WATER QUALITY PROTECTION

USDA, Soil Conservation Service, ACP Programs

Maryland Department of Agriculture, Maryland Agricultural Water Quality Cost-Share Program (MACS)

MACS cost-shares are available on 21 different BMPs. Most BMP/cost-share programs are administered and implemented by the Soil Conservation Districts, and their availability varies locally.

- Permanent Vegetative Cover Establishment

- to improve water quality by stopping wind or water erosion
- 5 year life, 60% cost-share (ACP)
- Soil Conservation Service (SCS) technical advisors
- MACS-10 year life, 87.5% cost-share



- Strip Cropping Systems

- to implement contour farming practices to reduce sedimentation into water and stop erosion
- 10-year life, 75% cost-share (ACP)
- SCS technical advisors
- MACS-5 year life, 87.5% cost-share

- Diversions

- to conserve water, control erosion, and reduce pollution from non-point sources through various waterway diversions
- 10-year life, 75% cost-share (ACP)
- SCS technical advisors
- MACS-10 year life, 87.5% cost-share

- Grazing Land Protection

- for installations that provide water at locations that will achieve erosion control through better distribution of grazing or proper rotation of grazing resulting in better grassland management
- 10-year life, 50% cost-share (ACP)
- SCS technical advisors
- MACS-10 year life, 87.5% cost-share

- Permanent Vegetative Cover on Critical Areas

- for critical areas such as gullies, banks, logging trails and roads, roadsides, field borders, etc., on farms that are susceptible to erosion or where runoff carrying substantial amounts of sediment constitutes a significant pollution hazard
- 5-year life, 75% cost-share (ACP)
- SCS technical advisors
- MACS-10 year life, 87.5% cost-share

- Water Impoundment Reservoir

- for farmland or ranchland on which the construction or sealing of water impoundment structures is needed for erosion control and other related eligible benefits
- 10-year life, 50% cost-share (ACP)
- SCS technical advisors
- no MACS assistance

- Sediment Retention, Erosion and Water Control Structures

- for specific problem areas on farms where runoff of substantial amounts of sediment or runoff containing pesticides or fertilizers constitutes a significant pollution hazard
- 10-year life, 75% cost-share (ACP)
- SCS technical advisors

INDEX TO SELECTED GOVERNMENT AGENCIES AND PROGRAMS INVOLVED WITH RIVER CONSERVATION IN MARYLAND

- MACS-15 year life, 60% cost-share (water control pond), sediment basin-87.5% cost-share

- Stream Protection System

- to correct specific problem areas on small streams or lakes located on or adjacent to farmland where the banks are subject to damage from livestock or where sediment or runoff constitute a significant water quality problem
- 10-year life, 50% cost-share (ACP)
- SCS technical advisors
- MACS-10 year life, 87.5% cost-share

- Sod Waterways

- for farmland needing permanent sod waterways to safely convey excess surface runoff water in a manner will reduce erosion
- 10-year life, 75% cost-share (ACP)
- SCS technical advisors
- MACS-5 year life, 87.5% cost-share

- Animal Waste Control Facilities

- for areas on farmland where animal wastes from the farm constitute a significant pollution hazard
- 10-year life, 75% cost-share (ACP)
- SCS technical advisors
- MACS-15 year life, 87.5% cost-share

HAZARDOUS AND SOLID WASTE REMOVAL

Maryland Department of the Environment, Hazardous and Solid Waste Management Administration

Responds w/highly trained personnel and equipment to spills or other releases of oil and/or hazardous materials. Superfund Program--investigates sites suspected of being impacted by the release of hazardous materials; includes development and implementation of remedial plans.

RIVERS

National Park Service, Rivers and Trails Conservation Assistance Program

Cooperates in State and local efforts to protect rivers and to establish trails on lands outside of national parks and forests. The program provides the following types of assistance to local communities: corridor conservation plans; statewide assessments; conservation workshops and consultations.

Maryland Department of Natural Resources, Greenways and Resources Planning: Scenic and Wild Rivers Program

Provides technical assistance to locally appointed citizen advisory boards to develop and implement river studies and management plans for state designated scenic and wild rivers. Program also provides technical assistance to other advisory boards, civic groups and organizations upon request to assist with river conservation. Performs environmental review of projects related to designated scenic and wild rivers.

SEDIMENT AND EROSION CONTROL AND STORMWATER MANAGEMENT

Maryland Department of the Environment, Sediment and Stormwater Cost-Share Program

Provides technical assistance and cost-share grants to local governments to design and construct sediment and stormwater control devices in urban and sub-urban areas.

SEWERAGE AND WASTEWATER TREATMENT

E.P.A., Office of Federal Activities (\$208 Clean Water Act)

Water quality--grants available.

Maryland Department of the Environment, Water and Sewerage Planning Section

Provides technical assistance and review of local government water and sewerage plans.

WETLANDS

E.P.A., State Wetlands Protection Development Grant Program

Provides grants for research, investigations, experiments, training etc. related to the development of wetland protection programs.

Maryland Department of Natural Resources, Water Resources Administration, NonTidal Wetlands Division

Provides technical assistance and permit reviews to state agencies and local governments.

AREA-WIDE WATERSHED ASSISTANCE

E.P.A., Chesapeake Bay Liaison Office

Provides administrative and technical support to the network of Bay regional committees and groups that run the Bay Program. Gives grants to non-profit organizations, business enterprises and other organizations to stimulate Bay preservation.

Department of Commerce, Coastal Energy Impact Program

Provides federal grants for development of coastal management and preservation programs, including the planning for the impact of offshore energy development on coastal states.

Department of Commerce; Estuarine Sanctuary Program

Provides matching grants to states for acquisition of areas to be maintained and operated as estuarine sanctuaries.

Maryland Department of Agriculture

Provides assistance to Soil Conservation Districts that in turn provide soil conservation and nutrient management planning, as well as assisting with numerous other watershed conservation activities.

Maryland Department of the Environment, Water Management Administration

Provides capital funds to communities for water supply treatment and distribution systems. Also responsible for the water quality components of MD's Chesapeake Bay Restoration Program; provides technical assistance and cost-share funding to local governments in order to correct locally severe water quality problems.

Maryland Department of the Environment, Small Creek and Estuary Restoration Program

Provides technical assistance and cost-share grants to local governments to restore degraded water quality in streams, rivers and small estuaries.

Maryland Department of Natural Resources, Water Resources Administration, Watershed Management Division

Develops plans based on the permit and planning activities of all WRA division and other water-related agencies of DNR. Also provides grants and technical assistance to local governments for flood studies and construction projects to reduce the hazards of flooding.

Maryland Department of Natural Resources, Critical Area Commission

Provides technical assistance, funding, critical areas program review and assessment services for the 16 counties and 44 municipalities affected by the critical areas. The grants enable the local governments to implement, amend and enforce the local critical areas programs. Commission also provides training workshops on critical areas.

Maryland Department of Natural Resources, Chesapeake Bay Trust

Provides grants for a broad array of projects that help Bay restoration efforts.

Maryland Office of Planning, Local Planning Assistance Program

Provides technical assistance, grants, local program review and planning design services for MD's counties and municipalities. Provides grants to encourage projects that produce planning strategies; reviews both comprehensive and functional plans submitted by local governments.

GB 1225 1311
M3 The Wicomico scenic river
W53 study and management plan
1994

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